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Vientiane–Hanoi Expressway Project

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Vientiane–Hanoi Express Way Project

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Executive Summary

The Lao People's Democratic Republic (Lao PDR) faces development gaps due to its unique landlocked location. To turn the weakness of being 'landlocked' into the strength of being 'land-linked' in the Mekong Region, Lao PDR needs to play a greater role as a logistics hub and to promote its own manufacturing exports in tandem with enhanced connectivity with China, Thailand, and Viet Nam. Complete national transformation is crucial not only for the country's industrial development, but also for accelerating the economic growth of the whole Mekong region. Against this background, the Vientiane−Hanoi Expressway (VHE) has been one of the most anticipated transportation projects between Lao PDR and Viet Nam. While these two countries concluded a memorandum of understanding on the VHE, the Lao PDR government endorsed ERIA and the Ministry of Public Works and Transport creating a working group with a keen interest in its early completion. This study project started out reflecting the Lao PDR government's expectations, and this report is submitted on the basis of the output produced by the working group.

This report: (1) explores the potentiality of the corridor between Hanoi and Vientiane as designated by the Greater Mekong Subregion Economic Development Program to obtain financial support from donors (e.g. ADB, World Bank, other official development assistance); (2) illustrates impacts on economies and industries of Lao PDR and surrounding countries such as China, Thailand, and Viet Nam via the VHE; (3) lays down industrial development strategies for Lao PDR, Viet Nam, and Thailand that take maximum advantage of the VHE; and (4) suggests appropriate financial mechanisms to construct the VHE. Thus, this report focuses on how Lao PDR and neighbouring countries can benefit from the expressway by strengthening relevant industries. In sum, our study analyses the economic and industrial impacts from the perspective of global value chains (GVCs) and production networks developed in the Mekong region.

Chapter 1 (by Masahito Ambashi) indicates that there is a high expectation of policymakers and the private sector toward connecting Bangkok and Hanoi, which have been growing as pillars of economic development in the Mekong region. While the road and railway connections between

Bangkok and Vientiane have been reinforced particularly on the Thailand side, those between Vientiane and Hanoi are still a missing link of this connectivity. In this regard, Chapter 1 stresses Vientiane−Hanoi connectivity in terms of GVC strategies. Specifically, as is currently happening in the manufacturing base dispersion from Thailand to the borders with the CLM countries Cambodia, Lao PDR, and Myanmar, i.e. 'Thailand-plus-one', this plus-one strategy may also be expanded to multinational companies in Viet Nam due to its rapid industrial advancement and resultant wage increases evolving around Hanoi and Ho Chi Minh City (i.e. 'Viet Nam-plus-one'). If these plus-one strategies are carried out in a full-scale operation, neighbouring countries will benefit from opportunities to be involved with deeper and wider GVCs, which will help them upgrade and export structures. Indeed, Lao PDR is expected to link both Thailand and Viet Nam as a core logistics hub between the two developed Mekong countries; at the same time, it will become a production hub that can serve as satellite factories linking mother factories in Thailand and Viet Nam. If Lao PDR played these roles, a Bangkok−Vientiane−Hanoi industrial corridor would emerge. For this reason, Chapter 1 insists that it is important to strengthen connectivity between Vientiane and Hanoi through the early completion of the VHE.

Chapter 2 (by Souknilanh Keola and Satoru Kumagai) quantifies the national, regional, and industrial economic impacts of the VHE and the Lao−Chinese High-Speed Railway using the Institute of Developing Economies and ERIA's Geographical Simulation Model. In addition, this chapter compares the impacts of using the official VHE candidate route (Vientiane−Bolikhamxay; approx. 450 km) to those of upgrading existing national roads (National Roads 8 and 12) into an expressway. The alternative simulation scenario assumes that logistic infrastructures will be completed by 2025. Gross regional product (GRP) is compared with that of the baseline scenario in 2030 and surplus (deficit) is regarded as a positive (negative) economic impact of the development of logistics infrastructure. Under this preparation, Chapter 2 simulates five major scenarios: (S1) the Lao−Chinese High-Speed Railway is completed in 2020; (S2) the official proposed route of VHE is completed in 2025; (S3) S2 + VHE from Nahkon Ratchasima is extended to Nong Khai in 2025; (S4) The upgrade of National Road No. 8 to VHE is completed in 2025; and (S5) The upgrade of National Road No. 12 to VHE is completed in 2025.

The first finding is that that Lao PDR obtains the most benefit (US$318.15 million) from Scenario 1 mainly through an increase in GRP in the services industry followed by apparel and food industries. Second, with respect to the VHE construction, Scenario 3 produces the highest gain for Lao PDR (US$201.04 million) amongst all other scenarios except Scenario 1, with which it shares a similar industrial growth pattern of GRP increase. In this scenario, the VHE literally becomes a part of a Bangkok−Hanoi expressway. Third, it is revealed that sub-regions along the expressway in Lao PDR and Viet Nam, but also in Thailand, would gain the most, but the location of the expressway within Lao PDR is profoundly important to its expected economic benefits. The VHE is expected to generate traffic volumes (in particular, between Vientiane and the border with Viet Nam) significantly larger than the national average. Finally, the region-wide benefit depends less on the Lao PDR section, and more on Viet Nam's and Thailand's sections, which suggests that the VHE would link two of the most prominent economic agglomeration cores of the lower Mekong region.

The VHE will connect the capitals of Lao PDR and Viet Nam, which have established special relations in politics, security, and ideology. Vientiane, however, has closer economic relations with Thailand than with Viet Nam and is farther from Hanoi than from Bangkok. Taking this disadvantage of the VHE into consideration, **Chapter 3 (by Masami Ishida)** comprehensively analyses the economic potential of the VHE based on the experience of the Mekong region in terms of trade, tourism, and foreign direct investment (FDI). First, although Lao PDR's largest trade partners as of 2017 are Thailand, China, and Viet Nam in ascending order, exports to the United States, Japan, and the Republic of Korea are strategically important. Since Lao PDR trade is skewed toward Europe and India, but weaker with the Pacific island countries, the VHE would have the potential to increase trade, especially exports, to these countries. Second, according to interviews with travel agents in Thailand and Viet Nam, Thai tourists in northeastern and northern Thailand (especially Chiang Mai) and Vietnamese tourists in central Viet Nam are likely to use the VHE. Third, the econometric analysis using data on Viet Nam reveals that with the expressway's development thus far, the amount of FDI increases while the effect of attracting FDI depreciates with distance from Hanoi. Thus, Viet Nam's experience in developing its

expressway network suggests the VHE's potential. For Lao PDR to realise this potential, planting high-value-added vegetables and fruits in mountainous areas, for example, should be promoted using the VHE that allows Lao PDR farmers to transport perishable goods to Hanoi. Furthermore, Chapter 3 points out that the potential of the VHE can be enhanced by deepening and expanding friendship agreements amongst cities and provinces and that cross-border costs including customs clearance should be reduced.

Then, Chapters 4 to 6 discuss the necessary development strategies of Lao PDR, Viet Nam, and Thailand vis-à-vis the VHE. **Chapter 4 (by Leeber Leebouapao and Sthabandith Insisienmay)** argues how Lao PDR can maximise economic benefits and enact industrial development strategies through the development of the VHE. To begin with, it is pointed out that Lao PDR's mountainous topography and lack of infrastructure are obstacles to further development and realising the potential for being a land-linked country, and connectivity within the country and with the region remains a major challenge. In this connection, the construction of the VHE—the shortest connecting road between Vientiane Capital and Hanoi—is also one of the focal tasks specified in the above-mentioned strategy on road transport. With respect to potential benefits brought about by the VHE, Chapter 4 predicts that it will facilitate not only expansion of Lao PDR's exports as transit trade, but also, to a greater degree, those of Thailand and Viet Nam.

Chapter 4 also draws attention to direct involvement of the VHE with at least five Special Economic Zones or Specific Economic Zones (SEZs), stressing the roles played by the Vientiane Industrial Trade Area (VITA Park) and Saythetta Development Zone. In fact, these two SEZs benefit from a direct connection to the Thai road network via the Lao PDR–Thai border checkpoints, particularly in Vientiane Capital, and have access to Bangkok harbour via the existing Thai railway from Vientiane Capital. But for these zones, the VHE will provide more opportunities for investors interested in Viet Nam, whether for market access or utilisation of Vietnamese seaports such as Vung Ang Seaport. In addition to the SEZs in Vientiane, other zones in the central part of the country, such as Phoukhyo Specific Zone and Savan−Seno SEZ, will be able to use the VHE as an alternative future route to Hanoi. As in the analysis of Chapter 3, the authors expect that the VHE will provide access to destinations both in Hanoi for tourists from

the northern part of Thailand and in the central and northern parts of Lao PDR for Vietnamese tourists.

Therefore, Chapter 4 concludes that Lao PDR will benefit greatly from the construction of the VHE as a result of trade generated from the use of the expressway and spillover effects from connection to major cities, industrial estates, and tourist sites along or near the road. The VHE will achieve smoother flows of goods, more reliable service delivery, and higher business profits enabled by the faster and cheaper movement of freight, which helps Lao PDR's businesses be more competitive internationally. It is also concluded that increasing activities and employment in other supporting industries are expected through both direct and indirect effect of the construction. However, such benefits depend on improving the capacity to cope with infrastructure projects, soft infrastructure, or institutional arrangements. It is imperative that Lao PDR improve the quality of construction materials and the capacity of local companies to meet the demands of large-scale construction projects. Furthermore, improvements and initiatives need to be more closely aligned with the committed international, regional, and bilateral transport agreements, particularly the Greater Mekong Subregion Cross-Border Transport Facilitation Agreement.

Chapter 5 (by Vo Tri Thanh) argues that, in the Socio-Economic Development Strategy, 2011–2020, Viet Nam also emphasises infrastructure, including roads, as one of the major breakthroughs. As observed in the Master Plan for ASEAN Connectivity and the Asia–Pacific Economic Cooperation Framework on Connectivity, Viet Nam's road projects no longer serve only domestic needs, but incorporate cross-border links for smoother and less costly flows of goods, services, and people. In this sense, the VHE is an initiative to enhance road links from Vientiane, as well as provinces in Viet Nam, to Hanoi. In a review of the road system in Viet Nam, Chapter 5 reveals that its underdevelopment is amongst the reasons for the country's logistics costs (20% of gross domestic product [GDP]), which are almost twice the international average, making the country uncompetitive. On the other hand, it is demonstrated that the provinces along the VHE have attracted FDI to a varying degree in tandem with their economic growth. Therefore, these findings suggest that the VHE could improve facilitating the flow of goods and

services across the five provinces the expressway transverses (Hanoi, Ha Nam, Ninh Binh, Thanh Hoa, and Nghe An). This impact can be realised through the widening of roads and/or shortening of travel times, with similar highways (e.g. Hanoi−Hai Phong highway) illustrating the potential improvements.

Thus, due to the development of the VHE, FDI in the aligning provinces would further increase, and this in turn would induce their industrialisation by facilitating their flows of goods to the major provinces and seaports in the northern economic triangle. Furthermore, according to the interview conducted by the author, the construction of the VHE is good timing because the Vietnamese government has deepened efforts to reform the business environment and strengthen competitiveness, including measures to reduce costs of doing business. Finally, Chapter 5 concludes by highlighting the need for prefeasibility study, funding, and project scope scenarios, the fiscal space for finance, designing a network of secondary road links, and coordination with other neighbouring countries (especially Lao PDR and Thailand).

Chapter 6 (by Narong Pomlaktong) addresses how to maximise Thailand's VHE benefit, showing an expectation that it will increase trade flows with neighbouring countries, in particular, Viet Nam. Since logistics becomes increasingly important as the world economy develops, having additional routes is considered a solution that tightens connectivity and narrows the development gap between countries and regions. In this respect, the 5th Mekong River Crossing Bridge (5th Mekong Bridge) from Muang District, Bueng Kan Province in Thailand to Pak San District, Bolikhamxay Province is a highway network development aimed at making connections with Thailand (especially the upper northeastern region), Lao PDR, and Viet Nam. Then, Chapter 6 employs a computable general equilibrium (CGE) model to examine how collaboration of related countries in the development of the VHE and the consolidation of a Bangkok–Vientiane–Hanoi industrial corridor will affect national economic growth and geographical distribution of income in Thailand.

To assess the impact of regional collaboration on the development of cross-border transport infrastructure, the author assumes three alternative scenarios in Thailand: (i) Eastern Economic Corridor (EEC); (ii) EEC + 5th Mekong Bridge; and (iii) EEC + 5th Mekong Bridge + Kanchanaburi

SEZ. This CGE projection finds important contributions to a real GDP increase ranging from 0.164% to 0.168%. It is also demonstrated that the geographical impact on income redistribution expands in many provinces because of the benefits of being the production base for suppliers' raw materials and goods for export to Lao PDR at Bueng Kan border via the 5th Mekong Bridge.

Chapter 6 also explores the effect of collaborative industrial policies amongst Thailand, Lao PDR, and Viet Nam, which supposes external shocks with 10%–30% trade flow increases, resulting in 0.181%–0.184% real GDP increases. In conclusion, it is suggested that development of the economic corridor with an effort for increased trade flow is necessary to increase GDP and reduce the inequality of the geographical distribution.

One reason why the construction of the VHE is difficult is attributed to its cross-border surface transport infrastructure. This means that a strategic and operational framework for supplying international public goods and mobilising financial resources is crucial for successful cooperative development. **Chapter 7 (by Narong Pomlaktong)** discusses the challenge of how to share the costs and benefits amongst participating countries by indicating outsourcing and devolution as major ways to reduce government control of infrastructure development and management, the choice of which depends on the policy objectives and degree of stakeholder readiness. And yet, the combination of outsourcing and devolution being employed to supply infrastructure becomes more complicated when the design and implementation involve more than one country with diverse financial capabilities and fiscal constraints. In particular, the level of public debt is crucial to the country credit rating. Hence, Chapter 7 finds that the option of public–private partnerships (PPPs) for infrastructure development can be useful, showing various reasons why the private sector may be more efficient in carrying out operational activities than the government (e.g. management experience). On the other hand, the challenge of PPPs is how to reach a reasonable agreement when the operation is socio-economically beneficial but not financially viable, which is common, particularly for transport infrastructure development. This suggests that the choice between PPPs and government borrowing should be based on the need to balance the socio-economic merits of the project and its financial profitability. In addition, Chapter 7 insists that a special purpose vehicle must be created to manage PPP tasks efficiently

without undertaking any business other than the construction and operation of the project; this would internalise operation and management costs at the design stage to ensure that the project life cycle costs are minimised.

Another difficult issue is how to set up the burden sharing for transnational infrastructure development. Specifically, sharing the burden based on the proportionate length of road portion to be constructed in Lao PDR might not be perceived as fair by the country. Economic assessment based on the expected improvement of GDP stemming from the project cannot be the only determining factor. It is therefore necessary to establish a mechanism to ensure that financial strategies and conditions accommodate stakeholders' interests. In this respect, the steps of the contract design mechanism should be as follows: (i) determine the amount of financing required for construction, management, and operation; (ii) enumerate financing sources in accordance with the amounts, financial conditions, and costs; and (iii) select the financing source. It should be noted that this mechanism can be supported by two types of agreements, that is, both intergovernmental and host government agreements. In a nutshell, a good contract design should have a clear allocation of responsibilities and risks between stakeholders, a workable price adjustment mechanism, performance-based measurement, fair rewards and penalties, appropriate contract duration, and a dispute settlement mechanism. Finally, Chapter 7 analyses a concise financial model that incorporates various financing instruments with hypothetical financing volumes for a PPP project of the VHE. According to the most likely estimate, the payback period will be 8.6 years, although the result could vary on assumptions of interest rates, demand, etc.

Chapter 8 (by Masahito Ambashi) concludes with VHE promotional policy recommendations that are formulated in accordance with both multiple and individual countries of Lao PDR, Viet Nam, and Thailand in what follows.

(1) Policy recommendations of multiple countries:

- Establish a specific consultation system amongst Lao PDR, Viet Nam, and Thailand to work on a detailed study of the VHE;

- Deepen and expand friendship agreements amongst relevant cities and provinces to promote discussion of the VHE;
- Harmonise transport-related policies in coordination amongst the relevant countries;
- Reduce cross-border transport costs such as non-tariff measures.

(2) Policy recommendation for Lao PDR

- Improve the quality of construction materials and the capacity of local companies to meet the demands of large-scale construction projects;
- Improve soft infrastructure and institutional arrangements to reduce time and cost of custom clearance and quarantine;
- Establish an inland container depot in Vientiane as a logistics hub in the Mekong region;
- Promote planting vegetables and fruits in mountainous areas.

(3) Policy recommendation for Viet Nam

- Implement effectively the international economic integration process;
- Design a network of secondary road links to help connect the local districts with the VHE;
- Explore the fiscal space to finance certain components of the VHE project.

(4) Policy recommendation for Thailand

- Conduct necessary investments in the economic corridor;
- Redesign logistics in relation to Lao PDR and Viet Nam to increase trade flows;
- Develop a modal shift strategy to reduce costs and provide service advantage.

Chapter 1

Vientiane-Hanoi Expressway: Introduction

Masahito Ambashi

1. Background

The Lao People's Democratic Republic (Lao PDR) faces development gaps due to its unique landlocked location. To turn the weakness of being 'landlocked' into the strength of being 'land-linked' in the Mekong region, Lao PDR needs to play a greater role as a logistic hub and to promote its own manufacturing exports in tandem with enhanced connectivity with China, Thailand, and Viet Nam. As the joint study between the Economic Research Institute for ASEAN and East Asia (ERIA) and the Lao PDR Ministry of Industry and Trade stresses, complete national transformation is crucial not only for the country's industrial development, but also for accelerating the economic growth of the whole Mekong region (Nishimura et al., 2016).

Against this background, in November 2016, the governments of Lao PDR and Viet Nam concluded a memorandum on the Vientiane–Hanoi Expressway (VHE). Subsequently, in June 2017, H.E. Dr Thongloun Sisoulith, Prime Minister of the Lao PDR, and H.E. Mr Nguyen Xuan Phuc, Prime Minister of Viet Nam, made a request for possible expressway construction cooperation to H.E. Shinzo Abe, Prime Minister of Japan. Following instructions from the Japanese government, the Japan International Cooperation Agency (JICA) identified possible expressway routes connecting the two capital cities. JICA (2018) presented measures that would enhance their connectivity and viability in terms of not only the VHE's technical aspects, but also its social, economic, financial, and environmental impacts in Lao PDR and Viet Nam. Furthermore, in a summit meeting between Lao PDR and Japan in June 2018, Dr Thongloun Sisoulith requested follow-up support from Japan with regard to the VHE as it is an important issue for Lao PDR as a landlocked country, and Prime Minister Mr. Shinzo Abe responded emphasising his intention to strengthen connectivity of the Mekong region.

The multinational cooperation framework has promoted regional connectivity. Specifically, the 8th Ayeyawady−Chao Phraya−Mekong Economic Strategy (ACMECS) Summit[1] in 2018 issued the Bangkok

[1] The member countries of the ACMECS are Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam.

Declaration, which shows a determination to address a wide range of challenges against connectivity enhancement, such as harmonisation and simplification of rules and regulations to facilitate movement of people, free flow of goods, services, and investment, as well as financial cooperation to accelerate infrastructure development. In addition, the well-known Greater Mekong Subregion (GMS) Economic Development Program,[2], on the initiative of the Asian Development Bank (ADB), has developed the 'Mekong Economic Corridors' by facilitating construction of cross-border physical infrastructures and streamlining border controls.[3]

ERIA also has committed to Mekong industrial development since Nishimura et al. (2016) formulated industrial development strategies for Lao PDR. In November 2017, the author presented 'ERIA's New Study Proposal on Connectivity in the Mekong Region' at the Senior Officials Meeting of the 9th Mekong–Japan Summit, stressing that the smooth connectivity in the Mekong region would further evolve the global value chain. Following ERIA's claims of being prepared to study infrastructure investment and relevant cost-sharing mechanisms to improve the whole region's connectivity, present senior officials showed their high expectations toward ERIA's possible contribution. Furthermore, the Lao PDR government endorsed ERIA and the Ministry of Public Works and Transport creating a working group to study the VHE with a keen interest in its early completion. This study project started out reflecting the Lao PDR government's expectations, and this report is on the basis of the output produced by the working group.

2. Bangkok–Vientiane–Hanoi Industrial Corridor

2.1. Vientiane–Hanoi connectivity: missing link of Bangkok–Hanoi connectivity

There is a high expectation of policymakers and the private sector toward connecting Bangkok and Hanoi, which have been growing as pillars of economic development in the Mekong region. While the road and railway connections between Bangkok and Vientiane have been reinforced by an effort particularly on the Thailand side, those between Vientiane and Hanoi are still a 'missing link' of Bangkok–Hanoi connectivity. However, amongst economic corridors designated by the GMS Economic Development Program, the East–West Economic Corridor linking Savannakhet, Lao PDR, and Da Nang,

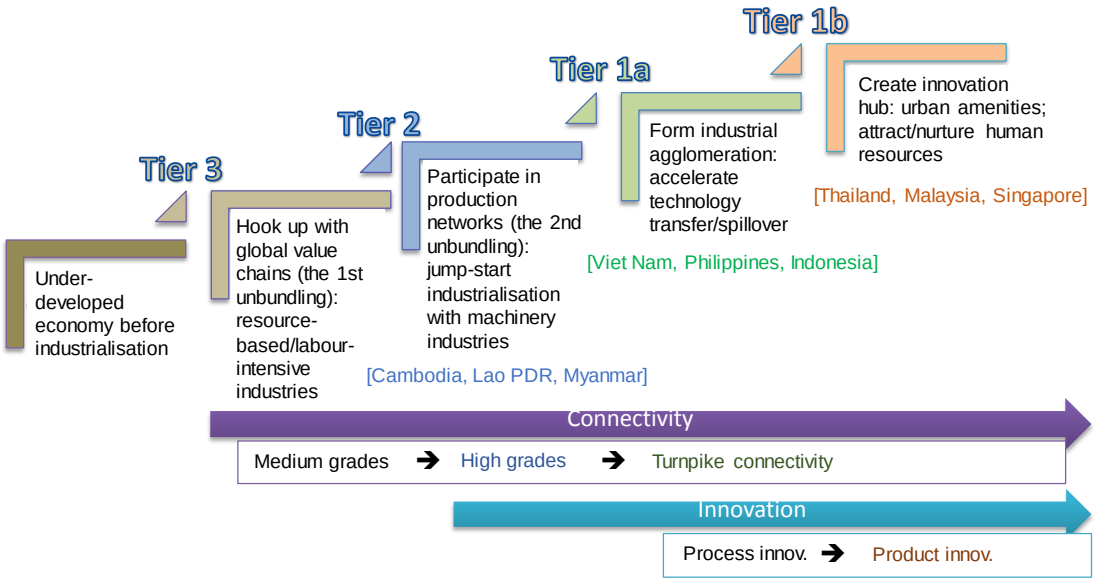
[2] The member countries of the GMS Economic Development Program are Cambodia, China (Guanxi Zhuang Autonomous Region, Yunnan Province), Lao PDR, Myanmar, and Viet Nam.
[3] The Cross-Border Transportation Agreement (CBTA) has complemented the GMS Economic Development Program with an aim to facilitate cross-border transportation.

Viet Nam, through Lao PDR's NR9 is the only one that connects the two countries. Although a sub-corridor connecting Bangkok, Vientiane, and Hanoi was added in the North–South Economic Corridor in 2016, any corridors directly connecting Vientiane and Hanoi have not been established yet.

2.2. Thailand/Viet Nam plus one

Association of Southeast Asian Nations (ASEAN) and East Asia has been the most advanced area in the world in terms of effectively utilising global value chains (GVCs). Nishimura et al. (2016), using the framework of ERIA (2015), proposed a development strategy based on the three tiers of development, which are categorised by different levels of participation in GVCs (Figure 1.1). Lao PDR is a country that employs sophisticated Tier-2 types of participation in GVCs, especially as observed in special economic zone areas, which are close to the Thai border. On the other hand, Thailand and Viet Nam belong to Tiers 1a and 1b, respectively: while Thailand needs to create innovation hubs and improve urban amenities to attract outstanding human resources that engage in product innovation, Viet Nam is rapidly forming industrial agglomeration and accelerating technology transfer through foreign direct investment (FDI).

Figure 1.1: Three-Tier Development Strategy



Source: ERIA (2015).

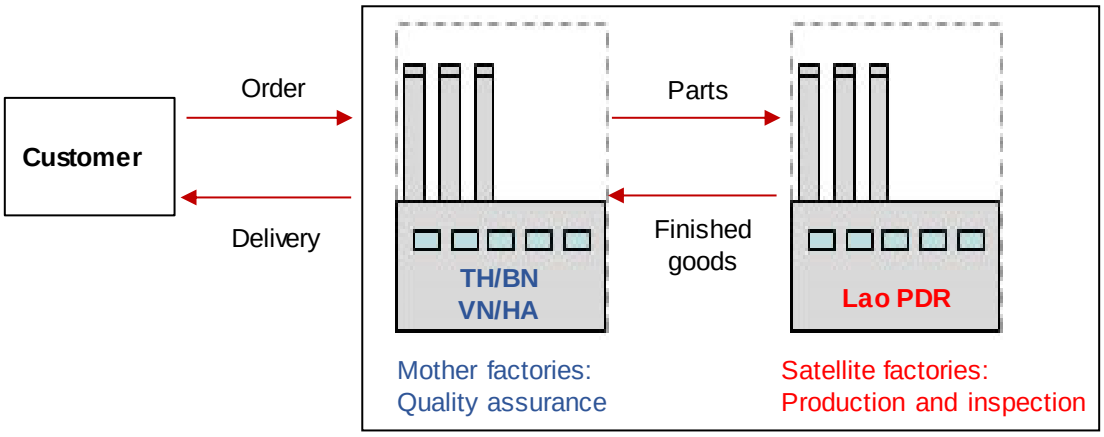
These multi-layered development stages generate unique GVC strategies in the Mekong region, which is frequently called the 'Thailand-plus one', developed mainly by Japanese multinational companies

(MNCs). Thailand and its neighbouring 'CLM' countries (Cambodia, Lao PDR, and Myanmar) are currently witnessing manufacturing base dispersion, particularly in automobiles, automobile parts, and machinery industries from Thailand to the border of the CLM countries. The reason why Thailand-plus one is developing is a sharp rise in labour costs of Thai workers, which undermines the investment environment; also contributing is risk aversion of disasters, e.g. the 2011 catastrophic flood in Ayutthaya and North Bangkok. In many cases of Japanese MNCs, labour-intensive processes are outsourced to factories in the CLM countries; then, final or semi-final products are brought back to mother factories in Bangkok.[4]

This 'plus-one' strategy may also be expanded to MNCs in Viet Nam due to rapid industrial advancement and resultant wage increases evolving around Hanoi and Ho Chi Minh City. In fact, though the 'Viet Nam-plus one' strategy is not widely prevalent for many Japanese MNCs, it is seriously under the discussion within them in the hope of finding cheaper labour in the CLM countries than in Viet Nam. If these plus-one strategies are carried out in a full-scale operation, neighbouring countries will be able to benefit from opportunities to be involved with deeper and wider GVCs, which will help them upgrade their industrial and export structures. Indeed, Lao PDR, despite a landlocked location, is expected to link both Thailand and Viet Nam as a core of logistics hubs between the two developed Mekong countries;[5] at the same time, it will become a production hub that can serve as satellite factories linking mother factories in Thailand and Viet Nam (Figure 1.2).[6] If Lao PDR played these roles, the 'Bangkok–Vientiane–Hanoi Industrial Corridor' would emerge (Figure 1.3). It is therefore important to strengthen connectivity, especially between Vientiane and Hanoi, through the early completion of the VHE.

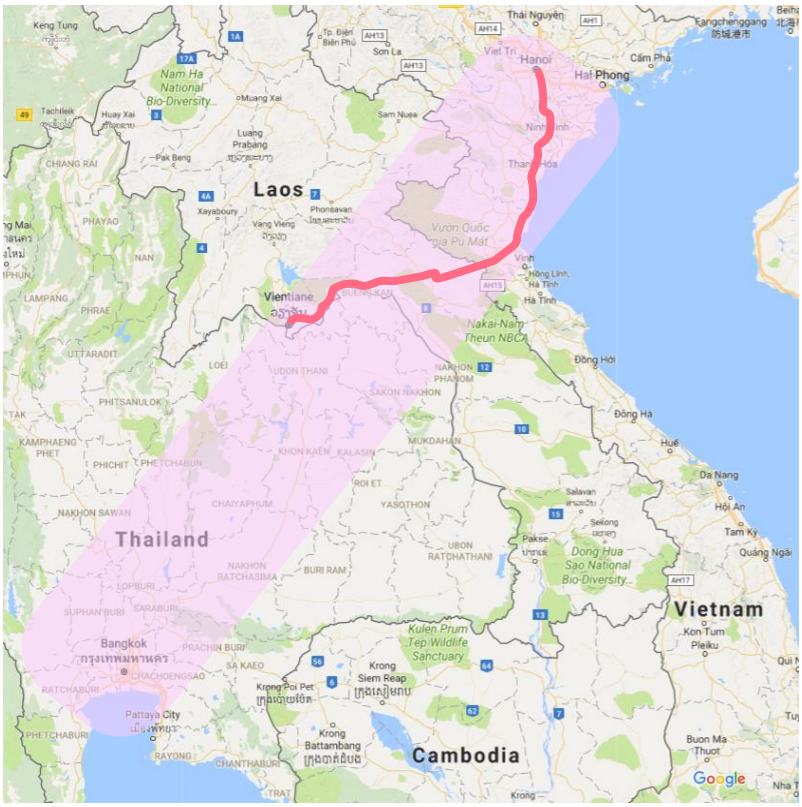
[4] Nikon Corporation (part of the camera production process) and Toyota Boshoku Corporation (car sheet production) deploy into the Savan-Seno Special Economic Zone in Lao PDR.
[5] Lao PDR is located in the centre of three large ports in the Mekong region: Leam Chabang (Thailand), Ho Chi Minh (south Viet Nam), and Hai Phong (north Viet Nam). Nishimura et al. (2016) proposed the strategy for the Lao transportation industry to arrange Savannakhet and Vientiane logistics hubs with improvement in physical infrastructures that connect to Thailand and Viet Nam.
[6] In the ERIA capacity-building symposium addressing 'Ways Forward to Develop Industrial Parks and Special Economic Zones in Lao PDR' on 8 February 2019, Mr. Masao Suematsu, the President of a Japanese automobile-related company in ASEAN, presented his idea that Lao PDR would have a potential to receive orders of production and inspection as satellite factories affiliated to mother factories in both Thailand and Viet Nam.

Figure 1.2: Thailand/Viet Nam Plus One



Lao PDR = Lao People's Democratic Republic, TH/BN = Thailand/Bangkok, VN/HA = Viet Nam/Hanoi.
Source: Compiled by the author in reference to the material provided by Mr. Masao Suematsu.

Figure 1.3: Bangkok–Vientiane–Hanoi Industrial Corridor



Source: Google Maps, modified by the author.

3. Objective of the Study

While the governments of Lao PDR and Viet Nam implemented a pre-feasibility study (pre-F/S) in 2016 and 2017 to assess routes that will connect Vientiane and Hanoi, JICA (2018) independently collected

data for enhancing connectivity between them. With respect to the former pre-F/S, JICA negatively states that:

> '…although the recommended route connects Vientiane and Hanoi along almost the shortest itinerary, more than 60% of the total length of the route inside the Lao PDR meanders through mountainous and valleys and thus there is a problem with the running performance of large-sized vehicles. In addition, it cannot expect almost any use by roadside population or development of road side areas. Furthermore, it passes through nature preserved areas.'

For this reason, JICA (2018) proposed the NR 8 route as an alternative, instead of the one recommended in the pre-F/S. The NR 8 route runs almost in parallel to the National Road No. 8 (corresponding to the route AH15 of the Asian Highway Network) located 50 kilometres south of the pre-F/S route. JICA's conclusion derives from comparing routes in a variety of aspects, for example, geographical features, speed of vehicles and travel time, demand forecasting, cost estimation, social and environmental impacts, total evaluation of routes, development phases, and economic and financial analyses. Taking these into consideration, JICA (2018) concluded that this alternative route is the most suitable from the perspective of construction of the VHE.

Meanwhile, this report aims to concentrate on: (1) exploring the potentiality of the corridor between Hanoi and Vientiane as designated by the GMS Economic Development Program to obtain financial support from donors (e.g. ADB, World Bank, other official development assistance); (2) illustrating impacts on economies and industries of Lao PDR and surrounding countries such as China, Thailand, and Viet Nam via the VHE; (3) laying down industrial development strategies for Lao PDR, Viet Nam, and Thailand that take maximum advantage of the VHE; and (4) suggesting appropriate financial mechanisms to construct the VHE. Thus, whereas JICA (2018) evaluated the VHE through a comprehensive analysis, we will focus on how Lao PDR and neighbouring countries can benefit from the expressway by strengthening relevant industries. In sum, our study will analyse the economic and industrial impacts from the perspective of GVCs and production networks developed in the Mekong region.

The report is structured as follows. Chapter 2 (by Masami Ishida) reviews economic potentials of the VHE to attract tourists, and the past influence of expressways on FDI in Viet Nam. Based upon the

geographical simulation model, Chapter 3 (by Souknilanh Keola) estimates the economic impacts across industries in Lao PDR and its neighbouring countries. Chapters 4 to 6 are country studies of Lao PDR (by Leeber Leebouapao and Stabandith Insisienmay), Viet Nam (by Vo Tri Than), and Thailand (by Narong Pomlaktong) that examine the appropriate strategies for leveraging the VHE in each country. Chapter 7 (by Narong Pomlaktong) focuses on the financial mechanism to cover construction, management, and operational costs. Finally, Chapter 8 (by Masahito Ambashi) concludes with recommendations for policymakers.

References

Economic Research Institute for ASEAN and East Asia (ERIA) (2015), *The Comprehensive Asia Development Plan 2.0 (CADP 2.0): Infrastructure for Connectivity and Innovation*, Jakarta: ERIA. http://www.eria.org/publications/the-comprehensive-asian-development-plan-20-cadp-20-infrastructure-for-connectivity-and-innovation/ (accessed 4 March 2019).

Japan International Cooperation Agency (JICA) (2018), 'Data Collection Survey for Enhancing Connectivity between Hanoi and Vientiane in Asia Region', Tokyo: JICA.

Nishimura, H., F. Kimura, M. Ambashi, and S. Keola (2016), *Lao PDR at the Crossroads: Industrial Development Strategies 2016–2030*. Jakarta: ERIA. http://www.eria.org/publications/lao-pdr-at-the-crossroads-industrial-development-strategies-2016-2030/ (accessed 4 March 2019).

Chapter 2

A Geographical Simulation Analysis of the Impacts of the Vientiane–Hanoi Expressway

Souknilanh Keola and Satoru Kumagai

1. Introduction

In 2016, the government of Lao PDR and Viet Nam agreed to jointly construct the Vientiane–Hanoi Expressway (VHE henceforth) in order to link the capitals of the two countries. Of the two initially proposed routes through Lao PDR, i.e. Vientiane–Xiengkhouang–Houaphan (approx. 600 km), and Vientiane–Bolikhamxay (approx. 450 km), the latter has been selected as the official candidate route of VHE. On the one hand, a preliminary study estimated that the Lao PDR section would cost between US$4 to 6 billion depending on the number of lanes. It needs to be noted that, despite the name, most of the planned expressways are within Lao PDR territory. Given the level of external debt Lao PDR is facing, it would be challenging for it to fund the construction unilaterally; external involvement, especially by countries that would also benefit from the project, is essential.

On the other hand, several extant national roads have been functioning as the land route linking the two countries. For instance, National Road No. 8 (NR8), which is currently the shortest and most-used route between Vientiane and Hanoi, was built in the 1980s and upgraded in 2000s. Nevertheless, NR8 is mostly mountainous and its quality is currently nowhere near that of an expressway. National Road No. 12 (NR12) through Khammouan province has also functioned as a land route linking Vientiane with central Viet Nam or Thailand and northern Viet Nam. National Road No. 9 (NR9), Lao PDR's section of the East–West Economic Corridor, has also been used as a land route linking Lao PDR with Thailand and central Viet Nam.

The aim of this article is twofold. Using the Institute of Developing Economies' Geographical Simulation Model (IDE–GSM), it first aims to quantify the national and regional economic impacts of the planned expressway. Second, it compares the impacts of the official VHE candidate route to the cost of upgrading existing national roads into an expressway.

The rest of this chapter is structured as follows. Section 2 summarises historical/theoretical backgrounds, basic structures, the baseline scenario, and the simulation procedure of IDE–GSM. Section 3 describes simulated scenarios. Section 4 discusses the results. Finally, Section 5 concludes with policy recommendations.

2. The IDE Geographical Simulation Model (IDE/ERIA–GSM)

2.1. What is IDE/ERIA–GSM?

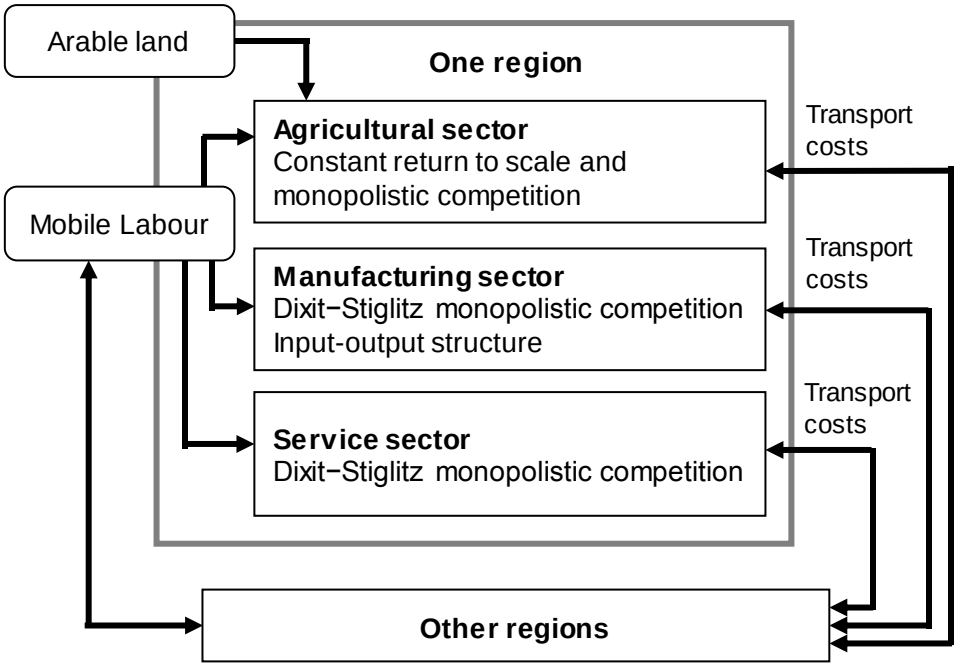
Since 2007, IDE–Japan External Trade Organization (JETRO) has been developing IDE–GSM. The theoretical foundation of the IDE/ERIA–GSM, which is co-developed with ERIA, follows 'New Economic Geography', in particular, Puga and Venables (1996), who captured the characteristics of multi-sector and country general equilibrium.

The IDE/ERIA–GSM features agriculture, five manufacturing sectors (automotive, electric and electronics, apparel, food processing, and other manufacturing), the services, and mining sectors. The model allows workers to move within countries and between sectors. A notable difference between the IDE/ERIA–GSM from that of Puga and Venables (1996) lies in the specification of the agricultural sector. The IDE/ERIA–GSM explicitly incorporates land size in its production and keeps its technology as constant returns to scale.[1] This model incorporates the type of physical or institutional integration that will favourably or adversely affect regions of interest. It also incorporates the impact of policy measures to facilitate international transactions on the magnitude and location of trade traffic. These enable us to identify potential bottlenecks and how to reap the full benefits of economic integration.

The basic structure of IDE/ERIA–GSM is depicted in Figure 2.1. Each region possesses seven economic sectors (agriculture, five manufacturing sectors, and the services sector).

[1] For further details of IDE–ERIA GSM, see Kumagai et al. (2015).

Figure 2.1: Basic Structure of the IDE/ERIA–GSM Geographical Simulation Model

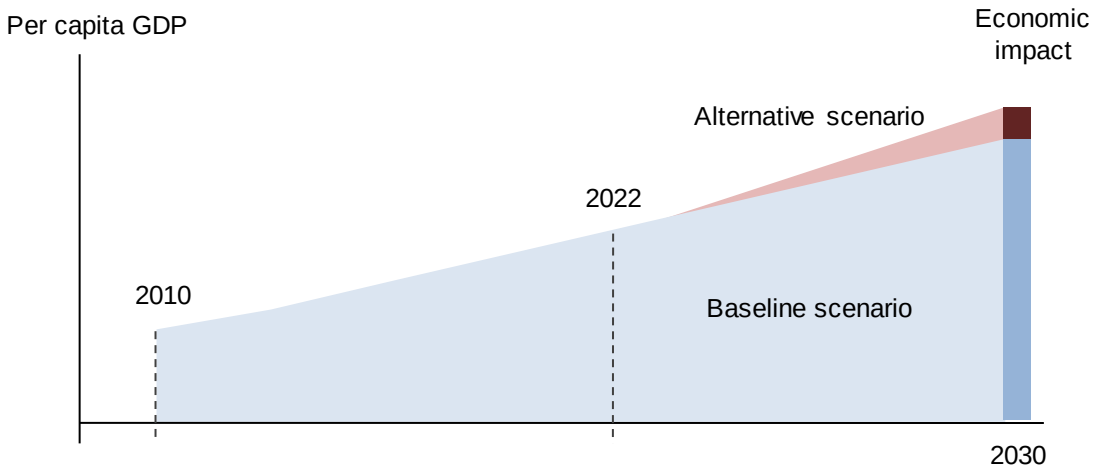


Source: IDE/ERIA–GSM Team.

2.2. Baseline Scenario and Alternative Scenarios

Figure 2.2 shows the differences in gross regional product (GRP) between the baseline scenario and alternative scenarios through calculating the economic impact of the development of various logistic infrastructures. The baseline scenario assumes national and regional growth based on official statistics and international organisation estimations after 2010. The alternative scenario assumes that several logistics infrastructures, mostly expressways, will be completed by 2025. We compare the GRP between these two scenarios in 2030. If the per capita GRP of a region under the scenario with specific critiera is higher (lower) than that under the baseline scenario, we regard this surplus (deficit) as a positive (negative) economic impact of the development of logistics infrastructures. It should be noted that the baseline scenarios have already assumed around 6% growth at the national level. In other words, the negative impacts do not necessarily mean that the GRP of a region or an industry would actually shrink compared to its current size. Instead, it just means that they would be smaller than what they might have expanded to, i.e. the baseline. More concretely, suppose the result predicts that agriculture in region A would be –1% compared to baseline in 2030. Moreover, suppose the baseline predicts agriculture would expand from 50 to 100, by whatever units, between 2025 to 2030. Out of 50, –1% is 0.2; therefore, it predicts that agriculture would expand from 50 to 99.8 instead of 100 in 2030.

Figure 2.2: Difference between the Baseline and Alternative Scenarios



GRP = gross regional product.
Source: IDE/ERIA–GSM Team.

3. Alternative Scenarios

We conduct a simulation analysis of three major scenarios: S1 to S5 as follows. In addition to the expressway, we also consider two ongoing projects, i.e. the Lao–Chinese High-speed Railway (HSR) project, which is expected to be completed by 2022, and The Fifth Lao–Thai Friendship Bridge (B5), whose construction is said to begin sometime between the end of this year and early next year.

(S1) The Lao–Chinese High-Speed Railway is completed in 2022

- Average train speed is set at 150 km/h

(S2) The official proposed route of VHE is completed in 2025

- The expressway from Bangkok to Nakhon Ratchasima is completed in 2022
- The Fifth Lao–Thai Friendship Bridge (BR5) is completed in 2022
- The average speed for the expressways is set at 80 km/h

(S3) S2 + VHE from Nakhon Ratchasima is extended to Nong Khai in 2025

(S4) S2 + Upgrade of National Road No. 8 to VHE is completed in 2025

- The construction of the expressway to connect NR1 (Viet Nam) to with NR8 (Lao PDR) is completed in 2025
- The construction of the expressway to connect NR2 (Thailand) with NR8 (Lao PDR) is completed in 2025
- The average speed for the expressways is set at 80 km/h

(S5) S2 + Upgrade of National Road No. 12 to VHE is completed in 2025

- The construction of the expressway to connect NR1 (Viet Nam) with NR12 (Lao PDR) is completed in 2025
- The construction of the expressway to connect NR2 (Thailand) with NR12 (Lao PDR) is completed in 2025
- Average speed for the expressways is set at 80 km/h

4. Results

4.1. By Countries

Overall impacts of scenarios S1 to S5 and selected countries are shown in Figure 2.3. The upper part depicts the result in US$ millions, while the lower depicts the result in percentage.

(S1) The Lao–Chinese High-Speed Railway

At the national level, Lao PDR would gain the most both in terms of absolute dollars and of percentage. HSR plans to operate cargo trains in addition to passenger trains. Our simulation of this project predicts that Thailand and China would gain more from cargo trains, given the current Lao PDR economy that depends on services. Nonetheless, when both passenger and cargo trains are in operation, Lao PDR would gain the most, followed closely by Thailand and China. In other words, although the scenario setting is not the same, the conclusion does not change significantly. Annual Lao PDR gain in 2030 compared to its baseline is about US$300 million, followed by Thailand with less than US$200 million, and China with US$100 million. The GDP difference for Lao PDR is about 1%, with a minimal difference for Thailand and China given their relative economic sizes. It should be noted that this scenario does not consider restrictions coming from the number of daily passenger/goods trains in real operation, while the speed is set at 150 km/h, or almost double that of the expressway. In reality, the HSR operation, such as the number of daily passenger/goods trains, is expected to affect the outcome in a significant way.

(S2) VHE without extension of Thailand's section

When ongoing S1 is not taken into account, the gain from VHE is slightly smaller than that of S1. However, as earlier noted, this can be due to scenario setting which assumes a much higher train speed without setting any restriction on the number of trains operating per day. In financial terms, Lao PDR

gains nearly US$200 million compared to the baseline in 2030, while Viet Nam gains nearly US$400 million and Thailand gains around US$700 million annually. For Viet Nam, in stark contrast to the resulting impact of VHE, there would be almost no gain from HSR. The large gains in Thailand include those coming from the completion of the under-construction expressway from Bangkok to Nakhon Ratchasima.

(S3) VHE with extension of Thailand's section

As far as VHE is concerned, the gain for Lao PDR is the highest amongst studied scenarios with extension of Thailand's section. Literally, VHE becomes a part of Bangkok-Hanoi expressway. The large gain in Thailand arises from the additional expressway, from Nakhon Ratchasima to Nong Khai, assumed to be constructed by the scenario date. As stated above, in addition to Lao PDR's section, and from the border with Lao PDR to National Road No. 1 in Viet Nam, we assume that the expressway from Bangkok to Nong Khai in Thailand would be completed by 2025.

(S4) VHE NR8 route

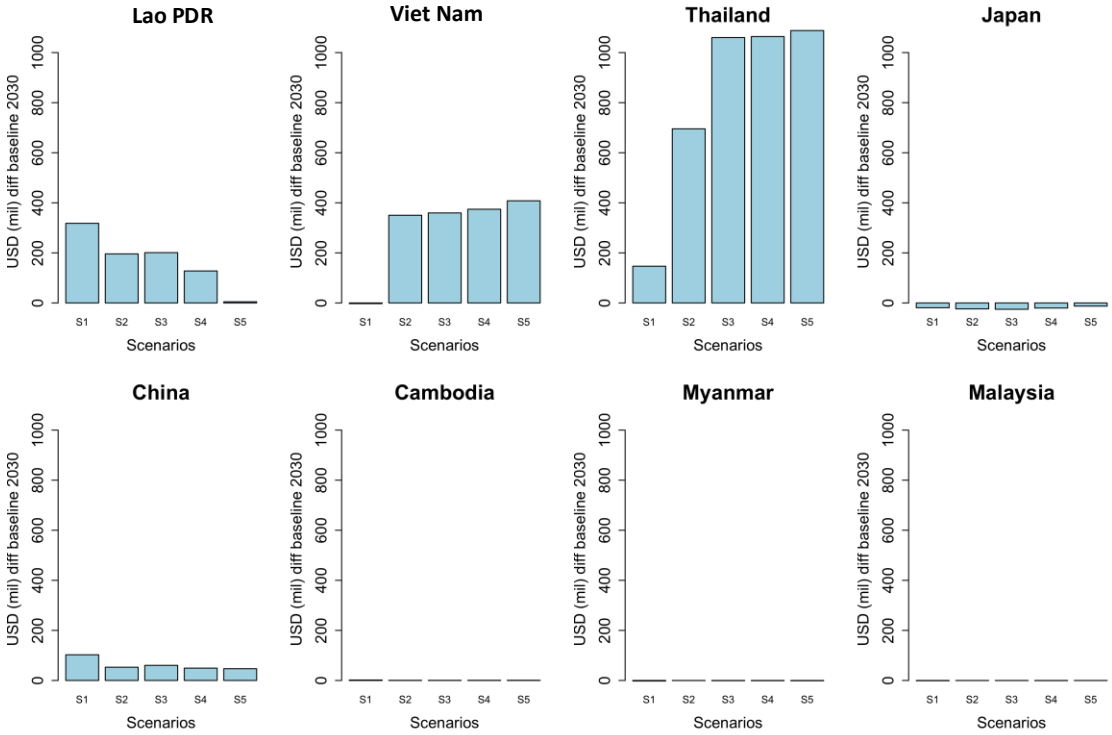
In this scenario, the Lao PDR section of VHE is assumed to be the NR8. We also assume Thailand and Viet Nam would link NR8 with their nearest respective expressways. This is to ensure that we consider the impacts of alternative expressway routes in Lao PDR properly. The VHE is obviously planned as a section of a wider cross-border expressway. VHE would not be completed without connection to Hanoi. In addition, we have to assume that Thailand would do the same in order to compare the impacts with the official proposed route. For Lao PDR, the benefit of VHE decreases significantly to about US$127 million from around US$200 million in S3. The overall gain for Viet Nam and Thailand are nevertheless almost unchanged.

(S5) VHE NR12 route

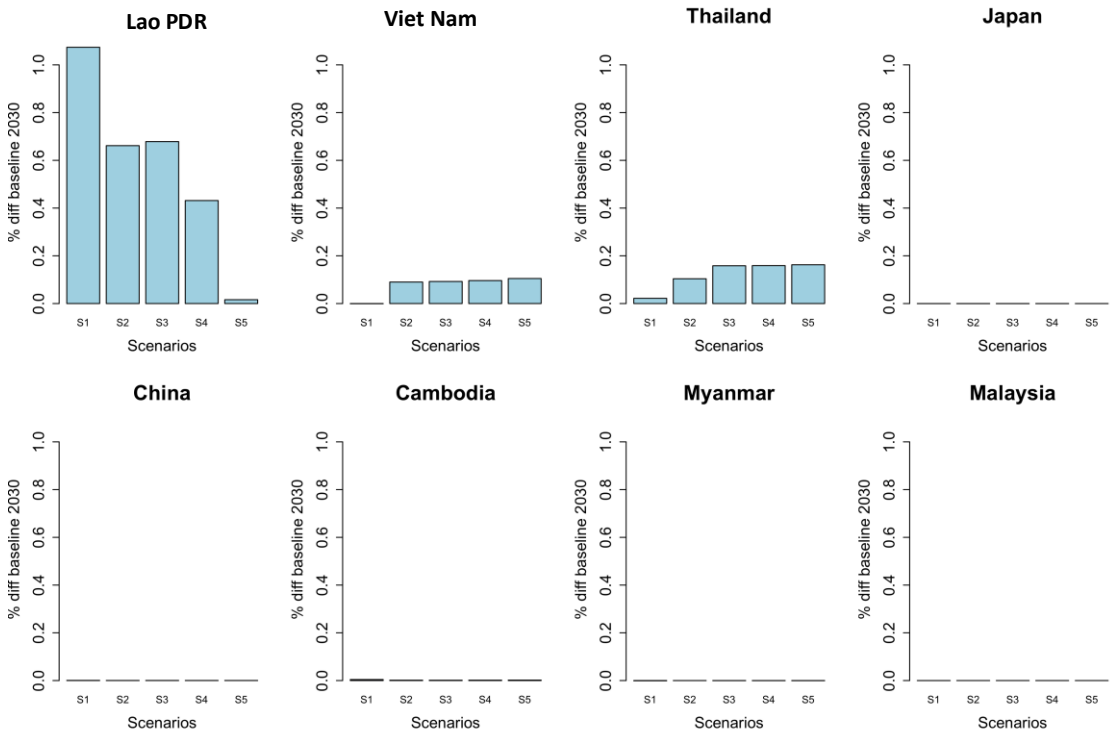
In this scenario, the overall gain for Lao PDR shrink substantially. It would still be a plus, but a very small one. However, the gain for Viet Nam and Thailand slightly increases. The results up to this point yield two interesting insights. First, the location of the expressway does not affect the benefit to Viet Nam and Thailand much as far as the link between Bangkok and Hanoi can be established. In other words, there is no change in benefit to Viet Nam and Thailand whether Lao PDR's section of VHE is the official candidate route or the NR8 or the NR12. The benefit for Lao PDR, however, depends strongly on the distance from the expressway to its capital city.

Figure 2.3: Impacts by Selected Countries

A: in US$ millions



B: in %



Lao PDR = Lao People's Democratic Republic.
Source: IDE/ERIA–GSM Team.

4.2. By Countries and Industries

Overall and by-industry impacts are shown in this section.

(S1) The Lao–Chinese High-Speed Railway

Although S1 outlines a high-speed railway project between Lao PDR and China, the overall impacts are highest for Lao PDR at US$318 million in 2030 against the baseline, followed by Thailand, at about US$146 million and then China at US$102 million. The 87% gain for Lao PDR comes from growth in services, followed by apparel, food, and other manufacturing, respectively. The food industry contributes the most to the gain in Thailand, followed by apparel and automotive industries. The gain for Chinese industries resembles that of Thailand, although on a smaller scale. The gain in other countries, including the immediate neighbours of Lao PDR are mostly minimal, i.e. less than US$1 million annually. Notably, agriculture shrinks compared to the baseline for all selected countries except Myanmar. It should be noted again that this does not mean the size of agriculture in each country would literally shrink.

Table 2.1: Results of S1 by Countries and Industries (in US$ millions)

	Lao PDR	Viet Nam	Thailand	Japan	China	Cambodia	Myanmar
ALL	318.15	(2.65)	146.87	(19.03)	102.64	1.86	(2.12)
AGR	(0.53)	(0.05)	(0.39)	(0.12)	(0.59)	(0.01)	0.00
AUTO	0.67	(0.02)	32.25	(4.56)	11.21	0.01	(0.03)
E&E	(0.03)	0.01	(3.73)	(1.64)	(2.08)	0.00	0.00
APPL	21.38	(0.86)	57.33	(2.06)	22.52	2.02	(0.03)
FOOD	9.66	(1.77)	77.88	(4.29)	57.23	(0.01)	(2.12)
OTH	3.79	0.13	(9.04)	(2.36)	0.72	(0.02)	(0,05)
SER	277.29	0.31	(7.59)	(3.95)	(4.65)	(0.13)	0.11
MIN	5.93	(0.41)	0.16	(0.04)	18.27	0.00	0.00

AGR = agriculture, APPL = apparel, E&E = electrics and electronics, Lao PDR = Lao People's Democratic Republic, MIN = mining, OTH = other manufacturing industries, SER = services.
Source: IDE/ERIA–GSM Team.

(S2) VHE without extension of Thailand's section

As mentioned above, the simulation result shows that the proposed expressway between Lao PDR and Viet Nam, without assuming extensions, other than those being constructed in Thailand, is expected to generate the most gain for Thailand (US$700 million) in 2030 against the baseline, followed by Viet Nam (US$350 million) and Lao PDR (US$196 million). Thailand is expected to gain in all industries, the largest being in services. Likewise, Viet Nam gains the most in services, followed by food industries. China gains in all industries except agriculture. Automotive industries are expected to expand in all selected countries, although the magnitude is often smaller except for Thailand (Table 2.2).

Table 2.2: Results of S2 by Countries and Industries (in US$ millions)

	Lao PDR	Viet Nam	Thailand	Japan	China	Cambodia	Myanmar
ALL	196.02	350.32	695.59	(23.61)	53.00	0.65	(0.39)
AGR	(0.60)	(0.21)	0.82	(0.28)	(0.31)	(0.03)	0.20
AUTO	0.15	1.01	24.67	0.68	2.18	0.00	0.00
E&E	0.17	5.19	18.73	(4.35)	9.94	0.00	0.00
APPL	12.49	9.60	20.66	(0.68)	4.93	0.92	0.00
FOOD	0.76	14.23	31.74	(2.52)	9.93	(0.02)	(1.01)
OTH	(1.36)	(0.72)	42.80	(3.75)	13.20	(0.04)	(0.11)
SER	183.43	321.14	556.18	(12.67)	8.10	(0.18)	0.54
MIN	0.98	0.08	0.00	(0.02)	5.03	0.00	0.00

AGR = agriculture, APPL = apparel, E&E = electrics and electronics, Lao PDR = Lao People's Democratic Republic, MIN = mining, OTH = other manufacturing industries, SER = services.
Source: IDE/ERIA–GSM Team.

(S3) VHE with extension of Thailand's section

Thailand's gain increases significantly when extension of Thailand's section is assumed (US$1 billion) in 2030 against the baseline. The overall gain for Lao PDR and Viet Nam remains more or less the same. Similar to the previous scenario, Thailand is expected to gain in all industries, the largest being in services. However, the gain for China decreases to almost half of the official proposed route.

Table 2.3: Results of S3 by Countries and Industries (in US$ millions)

	Lao PDR	Viet Nam	Thailand	Japan	China	Cambodia	Myanmar
ALL	201.04	359.64	1,059.98	(25.18)	60.40	0.59	(0.86)
AGR	(0.43)	(0.11)	0.83	(0.08)	0.57	(0.02)	0.24
AUTO	0.19	1.04	26.96	2.86	4.31	0.00	0.00
E&E	0.28	5.51	20.57	(1.82)	16.63	0.00	0.00
APPL	12.17	9.20	23.04	(0.47)	10.55	0.96	0.00
FOOD	1.50	14.37	35.18	(1.61)	13.44	0.00	(0.57)
OTH	(0.88)	0.42	45.18	2.00	40.92	(0.02)	(0.05)
SER	187.23	329.07	908.21	(26.07)	(31.39)	(0.32)	(0.48)
MIN	0.99	0.14	0.01	0.00	5.37	0.00	0.00

AGR = agriculture, APPL = apparel, E&E = electrics and electronics, Lao PDR = Lao People's Democratic Republic, MIN = mining, OTH = other manufacturing industries, SER = services.
Source: IDE/ERIA–GSM Team.

(S4) VHE NR8 route

As stated above, the gain for Lao PDR decreases significantly for this scenario. The decrease arises largely in services. The impacts by industries for the rest of selected countries remain more or less the same.

Table 2.4: Results of S4 by Countries and Industries (in US$ millions)

	Lao PDR	Viet Nam	Thailand	Japan	China	Cambodia	Myanmar
ALL	127.87	374.42	1,064.05	(20.31)	49.30	0.71	(0.91
AGR	(0.40)	(0.10)	0.86	(0.04)	0.72	(0.02)	0.23
AUTO	0.26	1.00	25.71	3.10	3.24	0.00	0.00
E&E	0.17	6.00	21.01	(1.33)	16.31	0.00	0.00
APPL	9.55	9.77	19.55	(0.42)	9.67	1.06	0.00
FOOD	1.37	13.60	30.12	(1.30)	10.22	0.02	(0.57)
OTH	(1.40)	0.38	46.48	2.19	35.91	(0.02)	(0.05)
SER	118.13	343.81	920.26	(22.52)	(28.58)	(0.33)	(0.53)
MIN	0.19	(0.02)	0.06	0.02	1.81	0.00	0.00

AGR = agriculture, APPL = apparel, E&E = electrics and electronics, Lao PDR = Lao People's Democratic Republic, MIN = mining, OTH = other manufacturing industries, SER = services.
Source: IDE/ERIA–GSM Team.

(S5) VHE NR12 route

The gain for Lao PDR in this scenario was reduced to only about US$5 million annually. The decrease arises largely in services. The impacts by industries for the rest of selected countries remain more or less the same.

Table 2.5: Results of S5 by Countries and Industries (in US$ millions)

	Lao PDR	Viet Nam	Thailand	Japan	China	Cambodia	Myanmar
ALL	4.79	408.08	1,088.03	(12.59)	46.98	0.84	(1.12)
AGR	(0.31)	(0.10)	0.91	0.03	0.93	(0.02)	0.22
AUTO	0.28	1.09	26.54	3.42	2.65	0.00	(0.01)
E&E	0.13	6.60	21.48	(0.46)	15.78	0.00	0.00
APPL	3.41	10.94	20.58	(0.58)	9.24	1.18	0.00
FOOD	0.85	14.97	31.23	(1.34)	9.48	0.03	(0.67)
OTH	(0.84)	1.34	47.27	2.98	28.88	(0.02)	(0.06)
SER	0.46	372.86	940.06	(16.66)	(24.55)	(0.33)	(0.61)
MIN	0.81	0.37	(0.03)	0.01	4.57	0.00	0.00

AGR = agriculture, APPL = apparel, E&E = electrics and electronics, Lao PDR = Lao People's Democratic Republic, MIN = mining, OTH = other manufacturing industries, SER = services.
Source: IDE/ERIA–GSM Team.

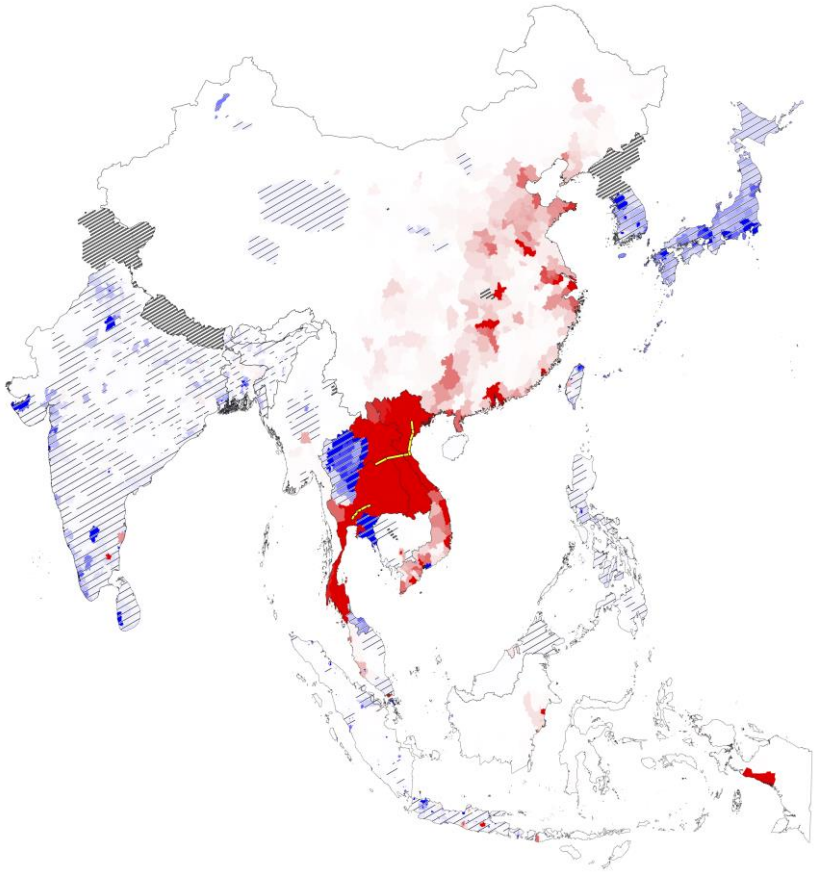
4.3. By Sub-National Regions

A major benefit of IDE-GSM is that it can estimate sub-national impacts. This section visually illustrates the simulation of ongoing and highly likely sub-national scenarios in order to elaborate the regional perspectives of the impacts.

(S2) VHE without extension of Thailand's section

First, Figure 2.4 shows the overall impacts. Sub-national regions along the expressway in Lao PDR and Viet Nam, but also in Thailand, would gain the most. Nonetheless, a loss is observed for Thailand's northwestern and lower eastern regions. The positive impacts are observed to extend along the eastern coast of Malaysia until Kuala Lumpur, although the rest of the country would suffer mild negative impacts. The positive impacts can also be observed in more distant regions in maritime ASEAN. Regions in Japan, the Korean peninsula, India, and other South Asian countries would also be negatively impacted, when compared to the baseline scenario.

Figure 2.4: Overall Impacts of S2 on Sub-National Regions

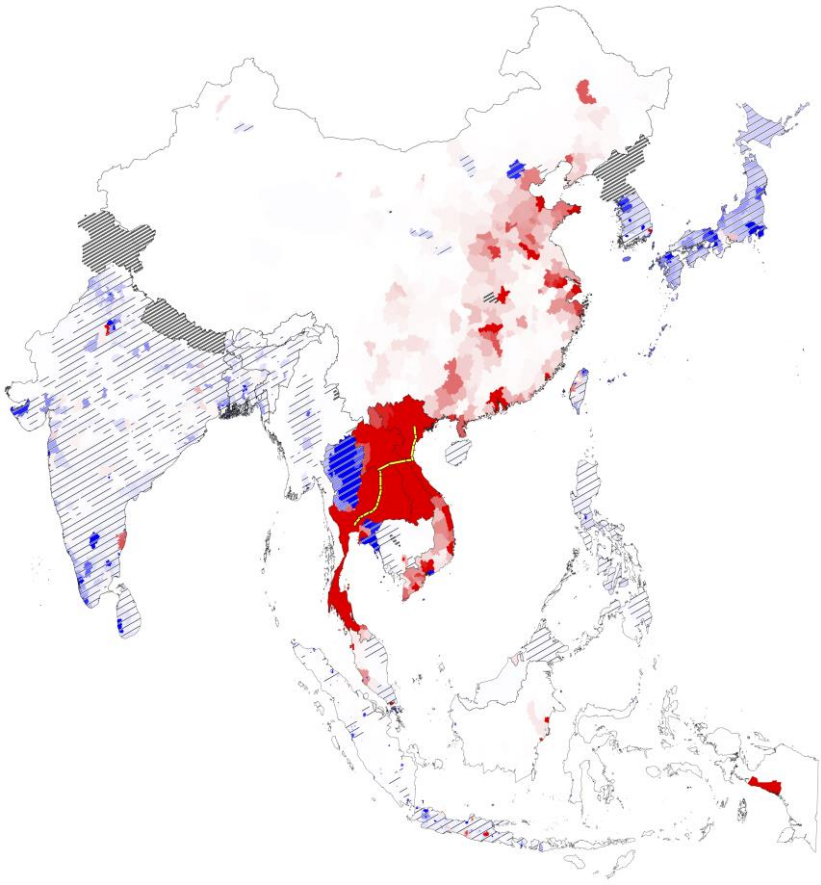


Source: IDE/ERIA–GSM Team.

(S3) VHE with extension of Thailand's section

Figure 2.5 shows the overall impacts for VHE, assuming the extension of expressway to complete the expressway link between Bangkok and Hanoi. The gain is enhanced, especially for regions estimated to gain in the previous scenario. The loss in Thailand's northwestern and lower eastern regions persist.

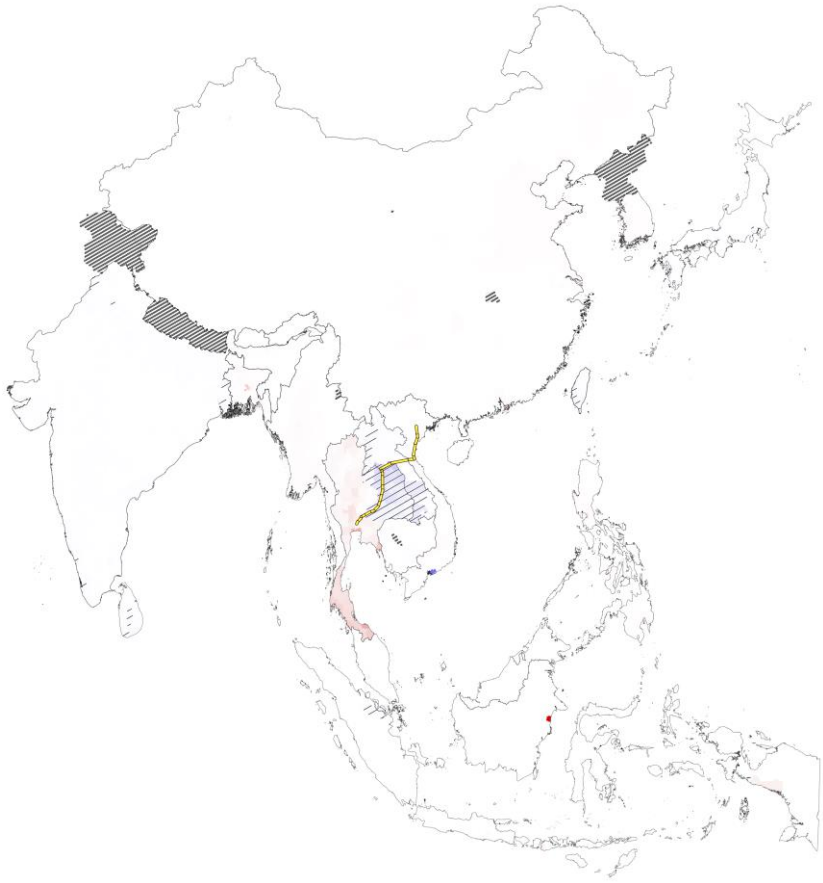
Figure 2.5: Overall Impacts of S4 on Sub-National Regions



Source: IDE/ERIA–GSM Team.

The rest of this section looks at the impacts by sub-national regions and by industries for S3, the officially proposed route of VHE, assuming the extension of Thailand's section; in other words, the most likely scenario. First, the impacts on agriculture are shown in Figure 6. The gain for agriculture is relatively small compared to the overall impacts. However, positive impacts are observed in all except the northwestern region, lower eastern regions and the southernmost regions in Thailand. These areas in Thailand are known for currently exporting many types of fresh fruit to China through Lao PDR and Viet Nam. The result for agriculture seems to predict that it would be enhanced by both expressways and railways.

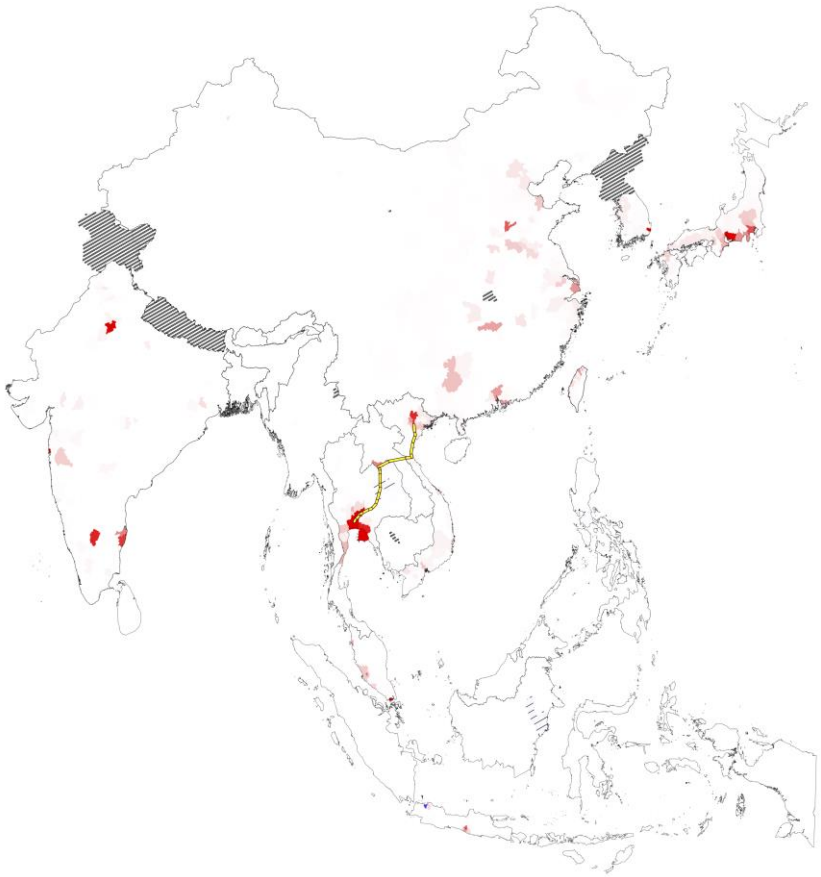
Figure 2.6: Impacts on Agriculture by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

Next is the automotive industry (Figure 2.7). China and Thailand have the largest agglomeration in the automotive industry. Viet Nam is making an effort to foster the automotive industry, while latecomers such as Cambodia and Lao PDR are beginning to see some relocation of lower value-added portions of the automotive industry into their countries. The interesting point of the impacts on the automotive industry is that almost no regions in any countries are negatively affected. The regions around the capital cities of Lao PDR, Viet Nam, and Thailand are expected to gain significantly, as compared to rural regions.

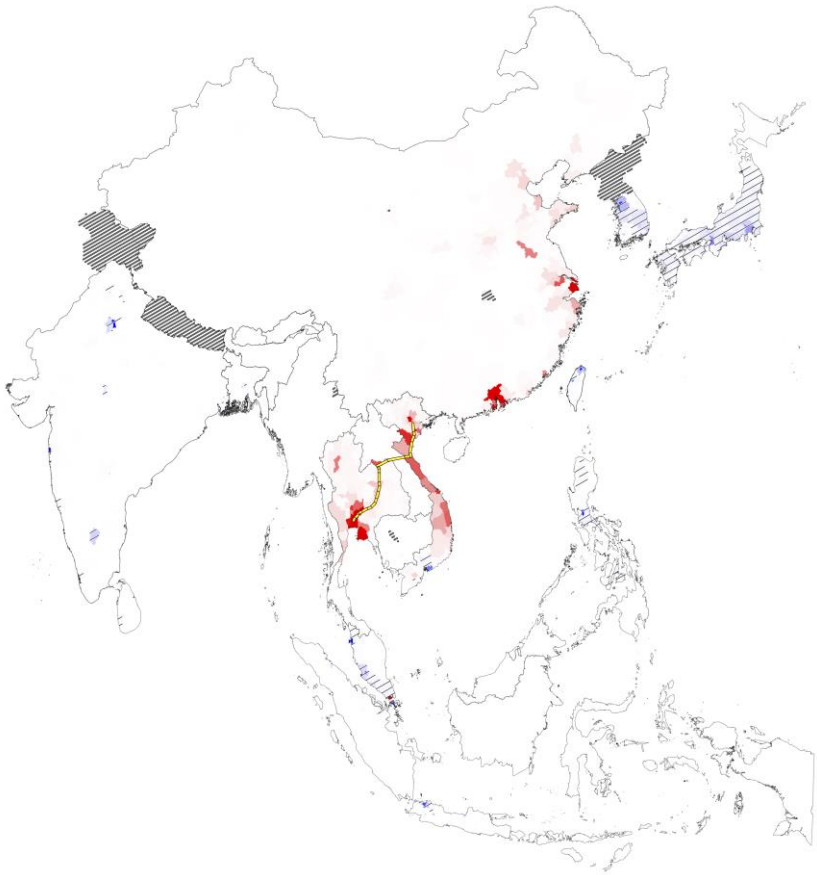
Figure 2.7: Impacts on Automotive Industry by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

The gain from electronics looks more encouraging for non-capital regions in the countries involved, especially in Viet Nam and Thailand. Except for the immediate vicinity of Ho Chi Minh City, all regions in Viet Nam are expected to gain significantly. The regions which are traditionally strong in electronics in Thailand, such as in Chiang Mai, are also expected to gain substantially. Coastal areas in China, which already have a large agglomeration of this industry, would also be positively impacted. In other words, a cross-border production network of the electrics and electronics industry is predicted to jointly benefit this part of the world.

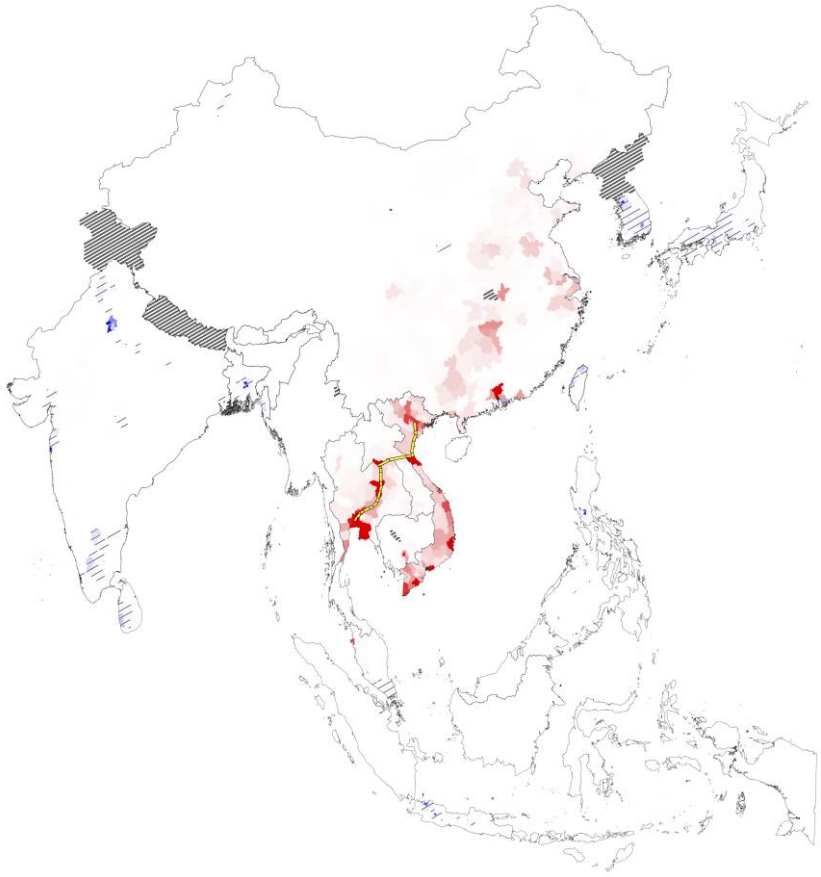
Figure 2.8: Impacts on Electric and Electronic Industry by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

The apparel industry, which remains a major part of countries in the region, is flexible, and can relocate easily to underdeveloped regions in developing countries. Our result shows that, except for some regions in India, Republic of Korea, and Japan, most sub-national regions would gain from the apparel industry (Figure 2.9).

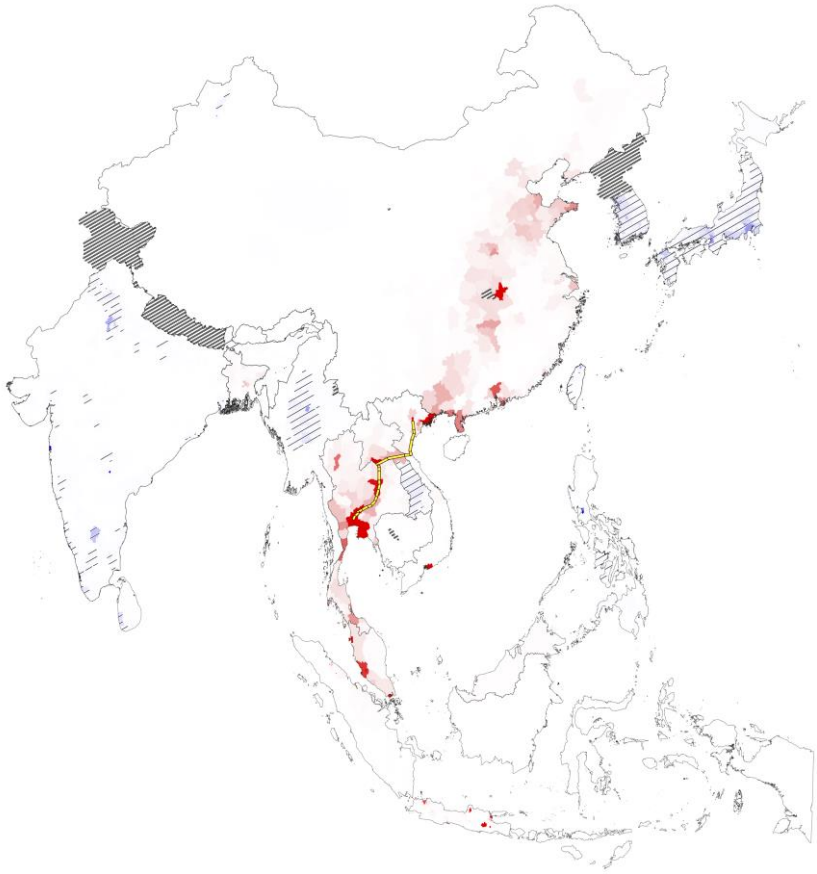
Figure 2.9: Impacts on the Apparel Industry by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

The gain in the food industry looks very promising for regions along the expressway and railway, not just in Lao PDR, but also Thailand (Figure 2.10). Our results predict significant gain in central and northern Lao PDR, and many regions, including Thailand's section of the East-West Economic Corridor.

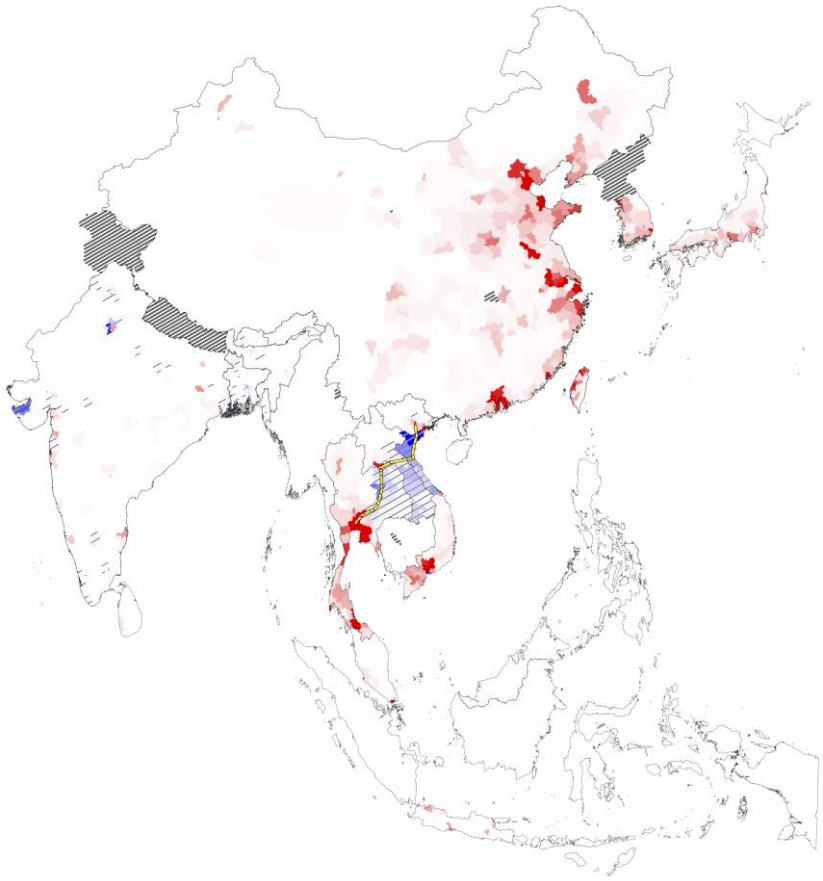
Figure 2.10: Impacts on Food Industry by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

Other Manufacturing Industries includes high-tech industries such as aviation and bio-industries. The capital areas of Lao PDR and Viet Nam are expected to gain marginally from these industries (Figure 2.11). On the other hand, the Ho Chi Minh City area of Viet Nam, areas surrounding Bangkok in Thailand, the coastal regions in China, and some regions in Japan are expected to gain from these high-tech industries.

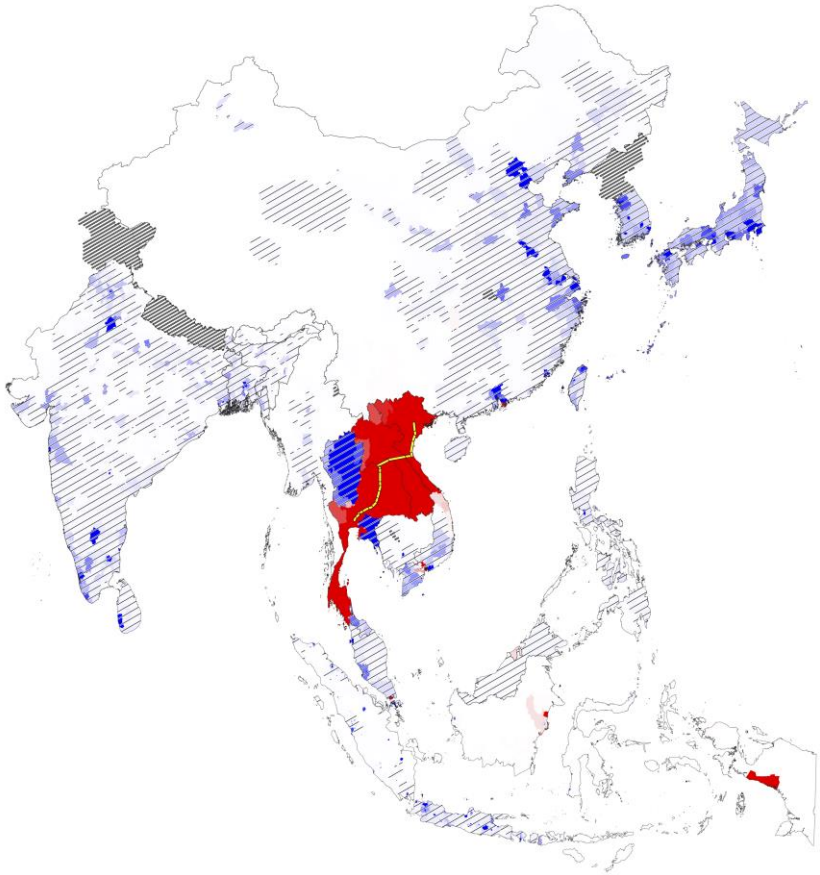
Figure 2.11: Impacts on Other Manufacturing Industry by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

As shown in absolute terms above, Lao PDR, Viet Nam, and the other countries involved would gain the most from services. A very strong location effect is illustrated. In other words, positive impacts are predicted for regions not very far from the projects included in the scenarios, i.e. expressways and railways.

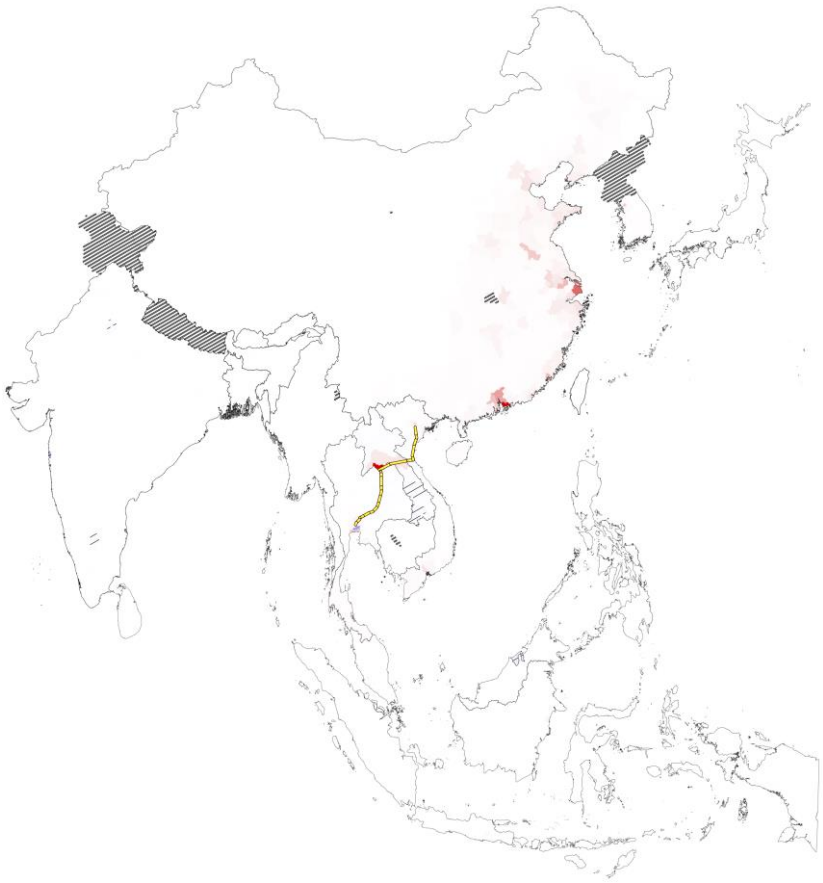
Figure 2.12: Impacts on Services by Sub-National Regions (S3)



Source: IDE/ERIA–GSM Team.

Finally, the impacts on sub-national regions and industries for the mining industry are depicted. Our result predicts the gain of mining activities in northern Lao PDR.

Figure 2.13: Impacts on the Mining Industry by Sub-National Regions (S3)

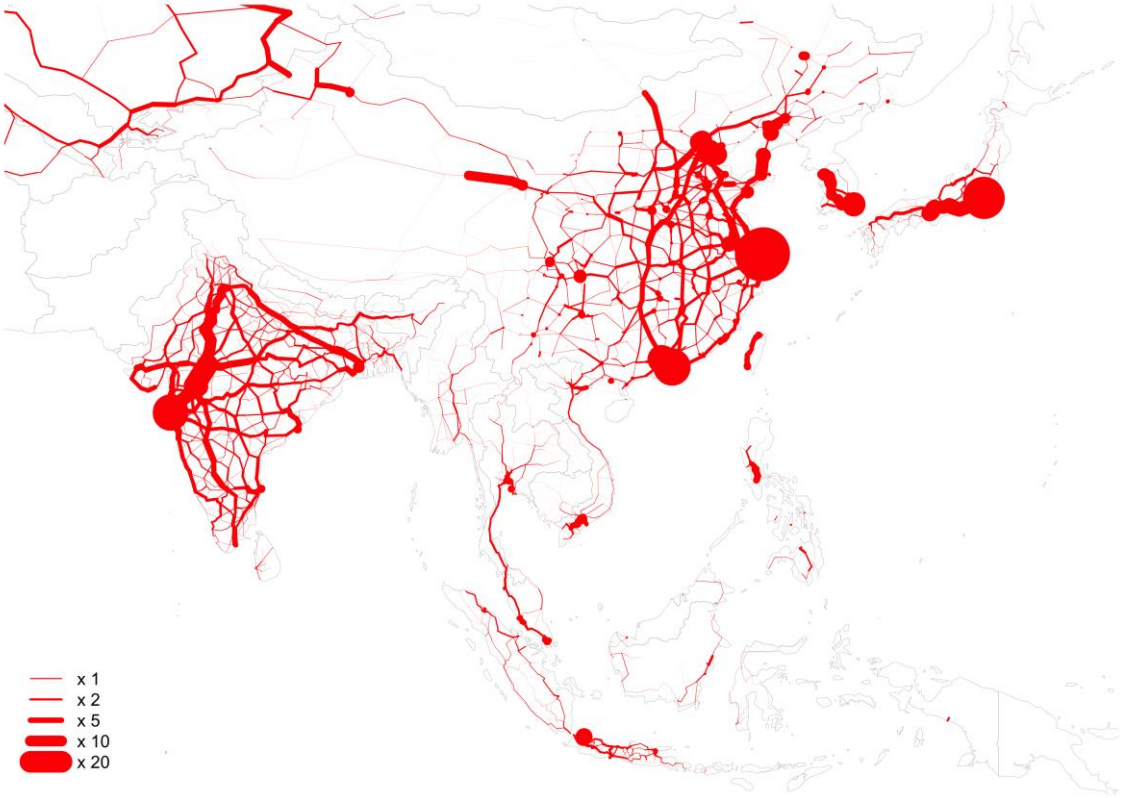


Source: IDE/ERIA–GSM Team.

The impacts analysed above focus on the increasing and/or decreasing of the scale of economic activity by industries and sub-national regions. In other words, they have a somewhat indirect impact on expressway developers. IDE/ERIA–GSM cannot be used to analyse cost and benefit of individual projects, i.e. whether developers could cover their cost or make a profit from such expressway development. Nonetheless, the IDE/ERIA–GSM can predict changes in traffic volume in relative terms. Here we would like to provide our prediction for the relative traffic volume from VHE, particularly of S3. Figure 2.14 shows the predicted relative traffic volume as compared to the world average in 2030. In comparative terms, VHE is not expected to generate traffic volume when compared to the world average (Figure 2.14). The global-scale traffic hotspots in Asia in 2030 would still be, for example, between Tokyo and Osaka along the eastern coast of Japan, and in the capital and Pearl River Delta regions in China. In addition, traffic between Mumbai and the capital region in India is also expected to grow significantly to rival other hotspots in Asia. The traffic volume in ASEAN is predicted to grow, but would remain smaller than in the aforementioned hotspots. In continental ASEAN, relatively large

traffic is expected in the capital regions of Thailand and Viet Nam. The largest transnational traffic in ASEAN is predicted to be between Bangkok and Singapore.

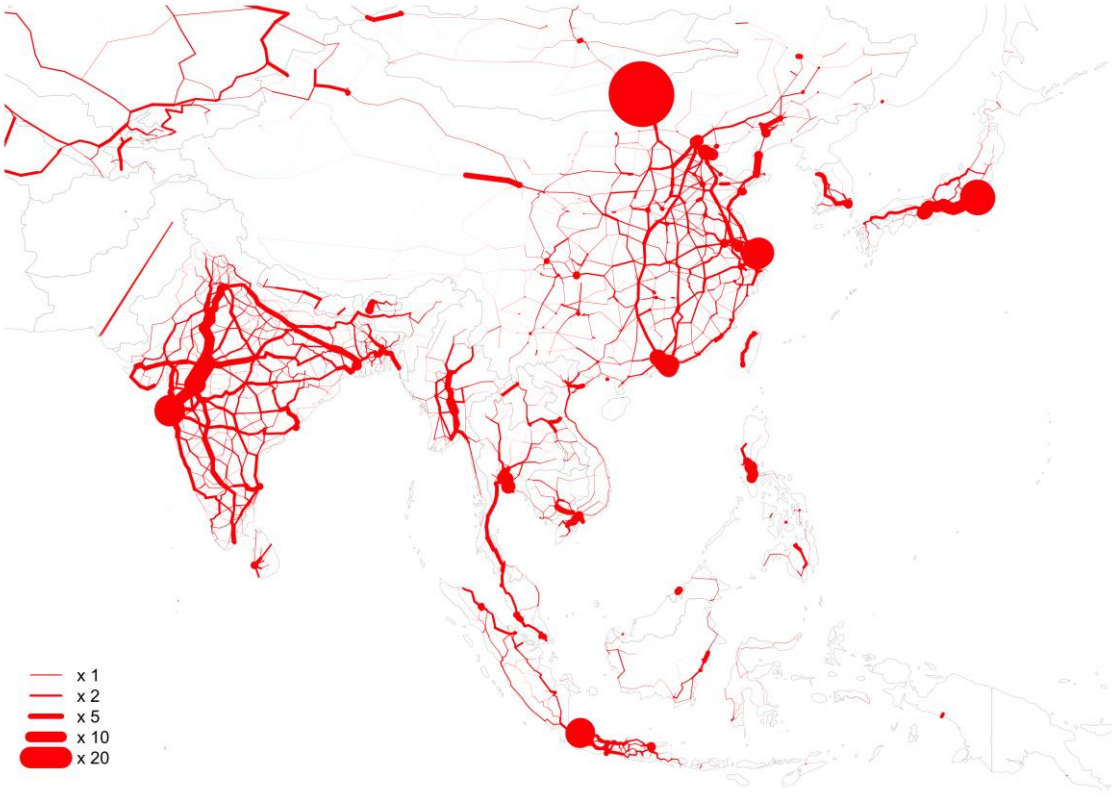
Figure 2.14: Predicted Relative Traffic Volume (vs. World Average) for S3



Source: IDE/ERIA–GSM Team.

Although the traffic volume of VHE is not expected to be comparable to the hotspots in Asia and ASEAN, it is expected to generate traffic volumes significantly larger than the national average. Figure 15 illustrates the predicted relative traffic volume as compared with the national average. It must be noted that the traffic volume in Figure 2.15 cannot be compared across countries. In Lao PDR, the largest traffic volume is predicted between the capital city along the VHE to the border with Viet Nam. So as far as Lao PDR is concerned, the expressway that links neighbouring capital regions through its own capital city is the one with the highest economic feasibility.

Figure 2.15: Predicted Relative Traffic Volume (vs. National Average) for S3



Source: IDE/ERIA–GSM Team.

5. Conclusions and Policy Recommendations

We conducted simulation analyses to study the economic impacts of the proposed Vientiane–Hanoi Expressway using IDE-GSM. In addition to the officially agreed-upon route, we also examined some alternative routes making use of existing national roads in Lao PDR. In general, we found the expressway is expected to benefit the sub-national regions that it passes through. The scale of the benefit depends, however, on the distance of the expressway to/from its capital city. In other words, for Viet Nam and Thailand, the benefit would be roughly the same regardless of the route within Lao PDR, as long as they construct their own expressways to connect to it. However, the location of the expressway within Lao PDR is profoundly important to its expected benefits. Finally, the region-wide benefit depends less on the Lao PDR section, and more on Viet Nam's and Thailand's sections, which would link two of the most prominent economic agglomeration cores of the lower Mekong region.

References

Kumagai, S., K. Hayakawa, I. Isono, S. Keola, and K. Tsubota (2013), 'Geographical Simulation Analysis for Logistics Enhancement in Asia', *Economic Modelling*, 34, pp.145–53.

Kumagai, S., I. Isono, T. Gokan, K. Hayakawa, K. Tsubota, and S. Keola (2015), 'Geographical Simulation Analysis by IDE–GSM' in *China (Shanghai) Pilot Free Trade Zone and the Future of Asia*, IDE–JETRO and Shanghai Academy of Social Sciences.

Puga, D. and A. J. Venables (1996), 'The Spread of Industry: Spatial Agglomeration in Economic Development', *Journal of the Japanese and International Economies*, 10(4), pp.440–64.

Chapter 3

Economic Potential of the Vientiane–Hanoi Expressway Based on Experience of the Mekong Region

Masami Ishida

1. Introduction

Lao People's Democratic Republic (Lao PDR) and Viet Nam have had special relations based on ties between the Lao People's Revolutionary Party and the Communist Party of Viet Nam since the revolutionary period (Savada, 1994).[1] Bilateral ideological, political, and security relations have been particularly tight.

The Truong Son mountain range (or Annamite Range), however, has hampered exchange between the two capitals (Keola, 2013) and the construction of a road directly connecting them. Two of the three economic corridors in the Greater Mekong Subregion Economic Cooperation Program are National Highway (NH) No. 9 of Lao PDR and Viet Nam, a part of the East–West Economic Corridor (EWEC); and NH No. 3 of Lao PDR, which connects Chiang Rai Province of Thailand and Yunnan Province of China, and is part of the North–South Economic Corridor (NSEC). Lao PDR's relations with Thailand are substantially closer than with Viet Nam (Kimura, 2000) and economic relations with Bangkok have become more important for Vientiane, especially since the First Mekong Friendship Bridge was built in 1994. It is not a good strategy, however, for Lao PDR to continue to strengthen economic relations only with Thailand. For example, trucks that deliver and collect Lao PDR imports or exports to and from Bangkok or Laem Chabang Port all belong to Thailand or foreign and not Lao PDR firms, partly because Thailand authorities are reluctant to allow Lao PDR trucks on Thailand's roads for safety reasons, despite the 1999 road transport agreement between Thailand and Lao PDR (Andersson and Banomyong, 2010). For Lao PDR, being able to send and pick up exports and imports to and from Hai Phong or Lach Huyen Port is strategically important. For Thailand, improving connectivity between Bangkok and Hanoi should be beneficial.

[1] Lao PDR became independent in 1953, led by Lao People's Revolutionary Party.

Lao PDR has closer economic relations with Thailand than with Viet Nam but has closer political and security ties with Viet Nam than with Thailand. Would the development of the Vientiane–Hanoi Expressway (VHE) change this situation? The first section of this paper examines the potential for change by describing the situation of national highways between Vientiane and Hai Phong via Hanoi and those between Vientiane and Bangkok, as well as trade relations between Lao PDR and Viet Nam and Thailand. The second section considers the potential of tourism. The third section shows possible economic effects of developing expressways using a case study of expressways in northern Viet Nam. The fourth section focuses on expressways' economic effects on foreign direct investment (FDI) approvals using econometric analyses. The fifth section recommends utilising the friendship of cities and provinces in Lao PDR, Viet Nam, and Thailand to improve trade, and presents challenges to reducing cross-border costs. Finally, the paper recommends policies.

2. Vientiane–Hanoi Expressway and the Road to Bangkok and Laem Chabang

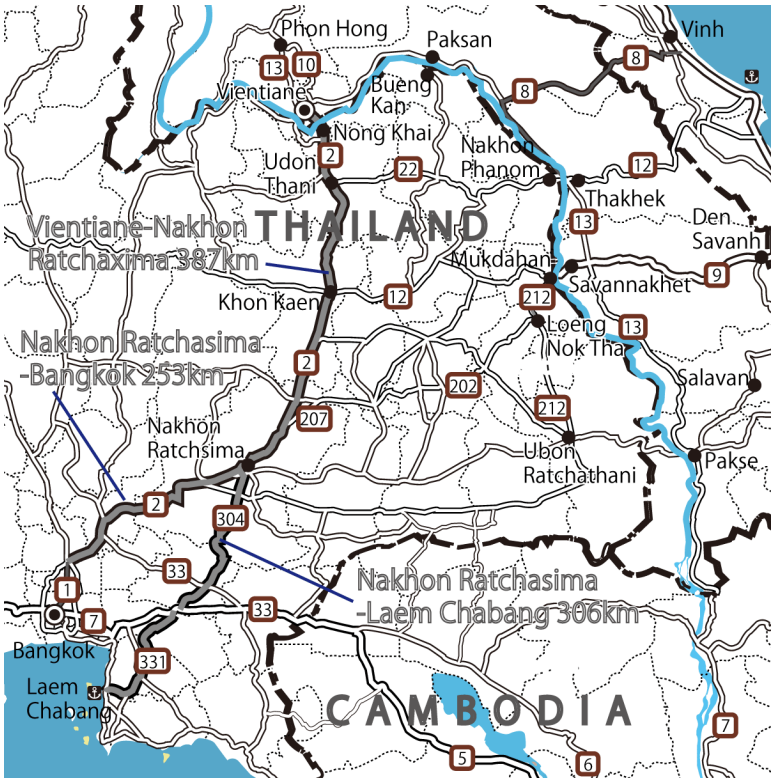
What difference would the construction of the VHE make for landlocked Lao PDR's access to the port? The distance from Vientiane to Bangkok and to Laem Chabang Port is compared with that to Lach Huyen Port, which is expected to be replaced by Hai Phong Port, Viet Nam, by way of an existing route similar to the VHE's. This distance is also compared with that to Vung An Port, in which the Lao PDR government holds shares, in Ha Tinh Province, Viet Nam. Then Lao PDR–Viet Nam trade will be comparable to Lao PDR–Thailand trade.

The distance from Vientiane to Bangkok Port is 640 kilometers (km) while that to Laem Chabang Port is 693 km (Figure 3.1) (IDE–JETRO, 2017). Most of the cargo transport between Vientiane and Bangkok and its surroundings, and between Vientiane and third countries uses these routes. The distance from Vientiane to Lach Huyen Port is 886 km (Figure 3.2), from Vientiane to Paksan in Lao PDR 150 km, from Paksan to Vinh in Viet Nam 310 km by way of NH No. 8, from Vinh to Phap Van in Hanoi 289 km, and from Phap Van to Lach Huyen 137 km. On the other hand, according to the recommended route between Vientiane and Vinh and the North–South Expressway Masterplan of Viet Nam,[2] the distance from Vientiane to Vinh is 400 km and that from Vinh to Hanoi is 294 km. Thus, the distance between

[2] The distance of the recommended route between Vientiane and Vinh is based on JICA (2018), and the distance between Ninh Binh and Vinh indicated by the North-South Expressway Masterplan of Viet Nam is based on JICA (2010).

Vientiane and Lach Huyen Port is 831 km; the distance from Vientiane to Phap Van around Hanoi is 749 km and will be 694 km. The difference in distance to Laem Chabang Port and to Lach Huyen Port is around 193 km based on the existing road and 138 km based on the proposed route. The distance between Vientiane and Vung Ang Port is 540 km.[3]

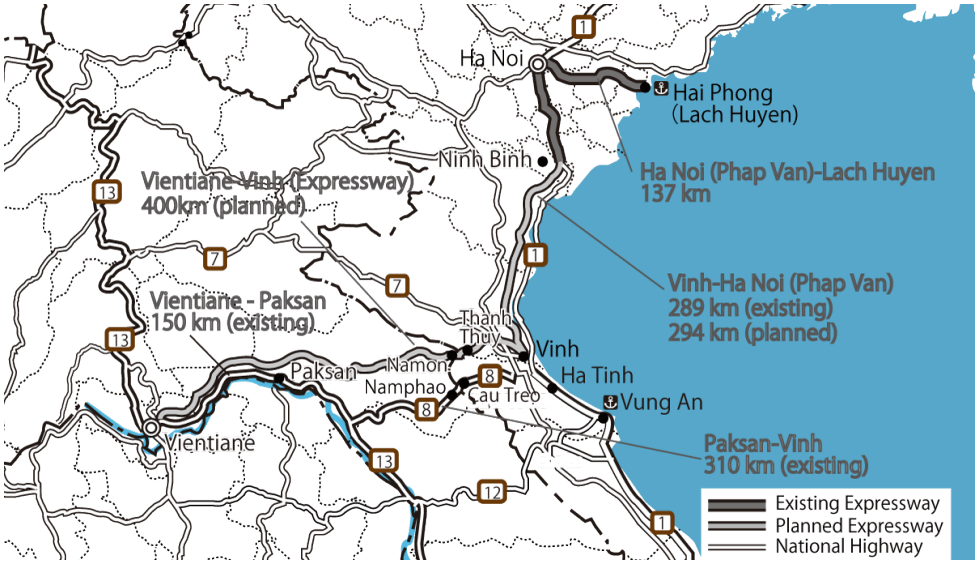
Figure 3.1. Routes Connecting Vientiane and Bangkok and Laem Chabang



Source: Author.

[3] The distance between Vientiane and Ky Anh near Vung Ang Port is 532 km according to a distance calculator. I calculated the distance between Ky Anh and Vung Ang Port at 8 km when I visited the port in 2011.

Figure 3.2. Highways Connecting Vientiane and Lach Huyen Port



Source: Author.

Lao PDR's exports from and imports to Thailand are around 40% and around 60% of Lao PDR's total exports and imports, respectively (Table 3.1). Lao PDR's exports from and imports to Viet Nam are 10%–20% and less than 10%, respectively. Lao PDR's trade with Thailand is greater than that with Viet Nam, and Viet Nam's imports from Lao PDR are declining. A comparison of Thailand's total exports and imports at borders with Lao PDR with the summary of imports to and exports from Lao PDR show that Thailand's exports at borders surpassed 100% of Lao PDR's total imports in 2017, while Thailand's numbers at the borders include transit trade by way of Lao PDR and by way of Thailand; exports and imports to and from Viet Nam, China, and Cambodia; and re-exports and exports to third countries by way of Thailand. It should be noted that exports are on a free-on-board basis and imports are on a cost, insurance, and freight basis.

Vung Ang Port is 540 km from Vientiane and nearer than Bangkok Port and Laem Chabang Port. However, few cargo ships drop at Vung Ang Port, which cannot compete with the two ports in Thailand. The distance to Lach Huyen Port is around 200 km longer than to Laem Chabang Port and Bangkok Port. The distance can be reduced to around 140 km with the development of the VHE. The length of the section, however, where trailer speed should be below 30 km/h, is estimated at 34.3 km between Vientiane and Vinh (JICA, 2018).

Table 3.1. Lao PDR's Trade with Thailand and Viet Nam

	2005	2010	2015	2017
1) Total Exports of Lao PDR	555.0	1,897.3	3,813.1	4,963.9
2) Lao PDR's Exports to Thailand	212.1	715.7	1,381.8	2,115.5
2) / 1) x 100	(38.2)	(37.7)	(36.2)	(42.6)
3) Thailand's Imports from Lao PDR at Borders	137.5	736.0	3,206.8	4,690.5
3) / 1) x 100	(24.8)	(38.8)	(84.1)	(94.5)
4) Lao PDR's Exports to Viet Nam	92.0	275.2	553.3	516.0
4) / 1) x 100	(16.6)	(14.5)	(14.5)	(10.4)
5) Total Imports of Lao PDR	1,200.7	3,448.7	7,227.5	7,024.3
6) Lao PDR's Imports from Thailand	815.5	2,263.0	4,419.5	4,150.7
6) / 5) x 100	(67.9)	(65.6)	(61.1)	(59.1)
7) Thailand's Exports to Lao PDR at Borders	555.1	2,643.4	5,978.0	8,346.2
7) / 5) x 100	(46.2)	(76.6)	(82.7)	(118.8)
8) Lao PDR's Imports from Viet Nam	73.4	210.3	554.7	687.4
8) / 5) x 100	(6.1)	(6.1)	(7.7)	(9.8)

Notes:
1) Numbers of exports are on a free-on-board basis and those of imports are on a cost, insurance, and freight basis.
2) Thailand's border trade with Lao PDR includes transit trade by way of Lao PDR.
Source: ADB Key Indicators for 1), 2), 4), and 5); and Bank of Thailand for 3) and 6).

The distance from the centre of Vientiane to the Tha Na Laeng–Nong Khai border with Thailand is just 19 km, but the distance to the Namphao–Cau Treo border with Viet Nam is 356 km; from the Cau Treo border to Phap Van (Hanoi), 393 km; and to Lach Huyen Port, 530 km.[4] On the other hand, the distance from Vientiane to the Nam On border is estimated to be 339 km.[5] A truck has to leave Vientiane around 11:00h or 12:00h, assuming an average speed of 40–50 km/h, for instance, if the border is closed at 20:00h, even though the distance to the border is shortened to 300 km. But if the truck crosses the border before 20:00h, it can arrive at Lach Huyen Port early in the morning. It would be better, therefore, if the border closing time could be made more flexible.

Viet Nam's share of Lao PDR's total exports is lower than Thailand's and declining. Viet Nam's share of Lao PDR's total imports is rising although it is still less than 10%. As of 2017, Lao PDR's second-largest

[4] These distances are estimated with my traveling record in December 2010, because the distance calculator did not show the distances.
[5] The distance from the Thanh Thuy border to Vinh is estimated to be 61 km (JICA 2018).

source of imports was China, followed by Viet Nam (Table 3.2), Japan, the Republic of Korea (henceforth, Korea), Germany, Singapore, the United States, India, and Hong Kong. The fourth-largest destination for Lao PDR's exports is India, followed by Japan, the United States, Germany, the Netherlands, the United Kingdom, and Korea. Exports to the United States, Japan, and Korea are strategically important. The United States ranks much lower than East Asian countries and lower than Germany as an exporter to Lao PDR. India ranks higher than Japan and Korea as a Lao PDR export destination. For Lao PDR's trade with Pacific island countries, the VHE is more advantageous than the road to Bangkok and to Laem Chabang. Increasing trade with Pacific island countries is yet another reason to develop the VHE.

Table 3.2. Lao PDR's Trade with Major Countries

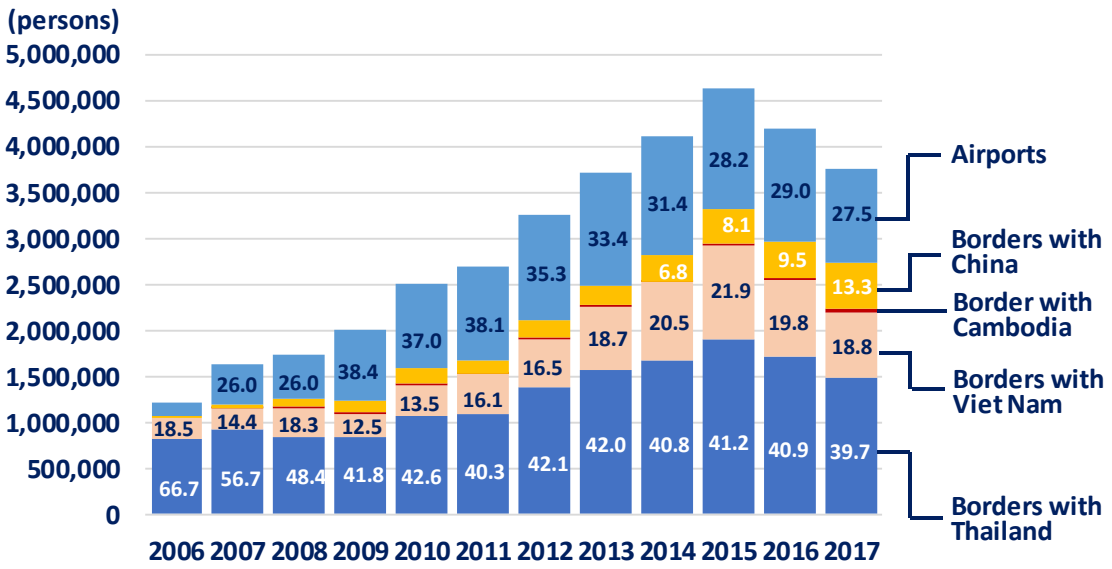
Imports, total	7,024.3	(100.0)	Exports, total	4,963.9	(100.0)
1. Thailand	4,150.7	(59.1)	1. Thailand	2,115.5	(42.6)
2. China	1,511.2	(21.5)	2. China	1,421.2	(28.6)
3. Viet Nam	687.4	(9.8)	3. Viet Nam	516.0	(10.4)
4. Japan	123.2	(1.8)	4. India	217.6	(4.4)
5. Rep. of Korea	100.7	(1.4)	5. Japan	140.7	(2.8)
6. Germany	36.2	(0.5)	6. United States	90.8	(1.8)
7. Singapore	33.8	(0.5)	7. Germany	81.6	(1.6)
8. United States	27.2	(0.4)	8. Netherlands	52.3	(1.1)
9. India	26.9	(0.4)	6. United Kingdom	25.8	(0.5)
10. Hong Kong	23.1	(0.3)	10. Rep. of Korea	25.1	(0.5)

Source: ADB Key Indicators 2018.

3. Potential of Tourism

How about the movement of people? The Lao PDR Department of Tourism Marketing, Ministry of Information, Culture and Tourism shows how many foreign tourists arrive by port of entry. Figure 3.3 shows the number and share by country. Tourists crossing the border with Thailand comprise the largest share—39.7%–66.7%—but this is declining. Tourists crossing the border with Viet Nam comprise 12.5%–21.9%, increasing until 2015. The trend of foreign tourists arriving in Lao PDR by way of Viet Nam was also upward until 2015 but declined after 2015.

Figure 3.3. Foreign Tourist Arrivals in Lao PDR by Border and Airport



Note: The numbers in the bars mean share (%) by country on the other side of the border.
Source: Based on figures from Tourism Department, Ministry of Information, Tourism and Culture, Lao PDR.

In 2015 and 2016, I interviewed tour agents in north-eastern Thailand and central Viet Nam. A tour agent at Ha Tinh, Viet Nam, said that tourists in Viet Nam who enjoy following routes have increased:

1) Ha Tinh or Vinh > Vientiane (first night) > Sightseeing in Vientiane > Udon Thani (shopping, second night) > Nakhon Phanom (Ho Chi Minh Memorial Complex) > Ha Tinh or Vinh (2 nights, 3 days). Some tourists visit Bangkok and Pataya after visiting Udon Thani.

A route that connects the Plain of Jars in Xieng Khouang, Luang Prabang, and Vientiane (4 or 5 nights) is also popular. The Ho Chi Minh Memorial Complex includes a house where 'Uncle Ho' lived for a while in the 1920s.[6] Tourists from Hanoi may fly back to Hanoi but those from central Viet Nam might be expected to use the VHE.

After the completion of the EWEC in 2005 and the Second Mekong Friendship Bridge in 2008, Thai tourists who enjoyed following tours increased temporarily:

2) Mukdahan > Hue (first night) > Sightseeing in Hue > Da Nang (second night) > Sightseeing in Da Nang

[6] The interview with a tour agent at Ha Tinh on 21 October 2016 and this survey result are part of a research project, Greater Mekong Subregion Economic Corridors Focusing on Human Connectivity, supported by a Grant-in-Aid for Scientific Research (C) of the Japan Society for the Promotion of Science, Grant Number JP26360036.

and in Hoi An > Hue (third night) > Mukdahan (3 nights, 4 days)

Some Thai tourists who enjoyed the above tour also chose a tour such as the following:

3) Nong Khai > Vientiane (first night) > Sightseeing in Vientiane > Vinh (second night) > Ninh Binh (second night) > Sightseeing in Hoa Lu and Tam Coc > Ha Long Bay (third night) > Sightseeing in Ha Long Bay > Hanoi (fourth night) > Vinh (fifth night) > Vientiane (sixth night) (6 nights, 7 days)

The tourists who enjoy this route are expected to use the VHE. Tourists in north-eastern Thailand may use the VHE, while tourists from Bangkok and suburbs usually take a direct flight to Hanoi. The tour agent at Ha Tinh said some Thai tourists from Chiang Mai also use the above-mentioned route. Thai tourists in north-eastern and northern Thailand and Vietnamese tourists in central Viet Nam should, therefore, be targeted.

4. Potential Economic Effects of Expressways

In northern Viet Nam, the following expressways have been developing rapidly over the past 10 years (Figure 3.4):

1) Phap Van–Cau Gie Expressway (completed on 1 January 2002)

2) Lang–Hoa Lac Expressway (completed on 3 October 2010)

3) Cau Gie–Ninh Binh Expressway (completed on 30 June 2012)

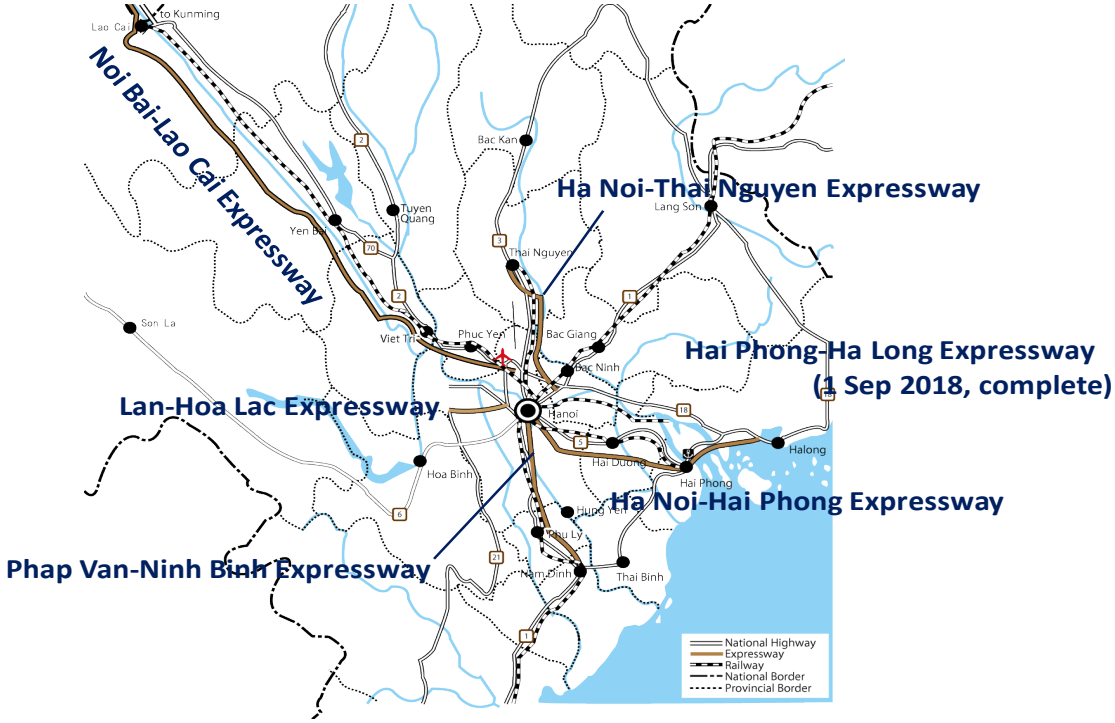
4) Hanoi–Thai Nguyen Expressway (completed on 13 July 2013)

5) Noi Bai–Lao Cai Expressway (completed on 21 September 2014)

6) Hanoi–Hai Phong Expressway (completed on 5 December 2015)

7) Hai Phong–Ha Long Expressway (completed on 1 September 2018)

Figure 3.4. Recent Development of Expressways in Northern Viet Nam



Source: Author.

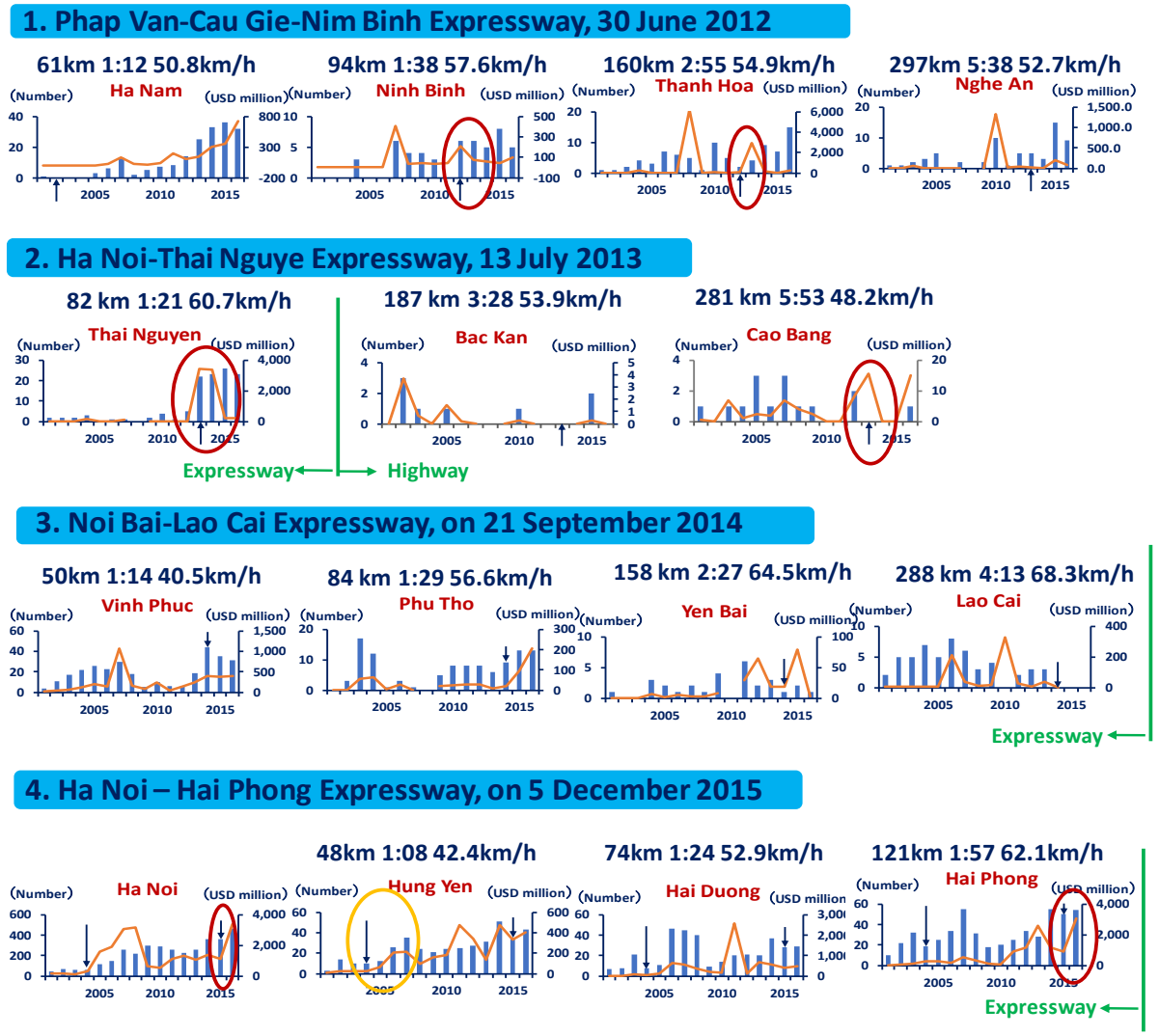
To know more about the economic benefits of expressways, I interviewed the people's committees of Phu Tho, Yen Bai, and Lao Cai provinces along the Noi Bai–Lao Cai Expressway in January 2016. The interviews tell us that the experiences of Viet Nam affect not only the VHE section in Viet Nam but also that in Lao PDR.

The People's Committee of Lao Cai Province, 292.8 km away from Hanoi, said that the number of domestic tourists using their own cars from Hanoi to Sa Pa, which attracts foreign and domestic tourists and is 321.9 km away from Hanoi, dramatically increased. Before the expressway, tourists had to take the night train from Hanoi to Sa Pa and back. But it takes only 4 hours to Sa Pa by car. Hotels and parking spaces could not keep up with demand.

The People's Committee also said shorter transportation time allowed farmers to transport vegetables and other perishable goods to Hanoi. Lao Cai City is just 90 metres (m) above sea level, Sa Pa is around 1,200–1,800 m above sea level. The difference in elevation makes it possible to produce various agricultural products, including high-value-added subtropical fruits and vegetables. Chiang Mai and Chiang Rai in Thailand also produce high-value-added agricultural products such as Doi Tung coffee, highland lettuce and carrots, tea, frozen vegetable juice, and cut flowers.

The people' committees of Phu Tho and Yen Bai provinces, which are 73.4 km and 158.5 km from Hanoi, respectively, pointed out that new industrial estates around the expressway interchanges have attracted more FDI (Figure 3.5). FDI approvals in Ninh Binh Province have increased since 2012, when the Phap Van–Cau Gie–Ninh Binh Expressway was completed. FDI has increased in Thai Nguyen Province since the Hanoi–Thai Nguyen Expressway was completed, and temporarily increased in Cao Bang Province when the expressway was extended. FDI increased in the provinces along the Noi Bai–Lao Cai Expressway, except in Lao Cai. FDI increased only in Hanoi a year after the Hanoi–Hai Phong Expressway was completed but there may have been other causes for this. FDI approvals increased in Hung Yen and Hai Duong provinces not after the expressway was developed in 2016 but after the road was expanded in 2000 and bridges strengthened in 2004 along National Highway No. 5.

Figure 3.5. Effects of Expressways on Foreign Direct Investment Approval



Notes: 1) Bars mean 'number' and polygonal lines mean 'amount' of FDI.
2) Distance, time, and speed are derived using a distance calculator.
Source: Calculated by the presenter based on Viet Nam's General Statistics Office data.

If the above-mentioned potential effects are promoted, the number of vehicles using the VHE will increase.

5. Econometric Analyses of Expressways' Effects on Foreign Direct Investment Approvals

The analyses of Figure 3.5 show some plausible effects of expressways' development on FDI approvals in the provinces traversed by expressways. Regarding the economic effects of road infrastructure, Fujimura (2018) estimates the growth rate of gross provincial product (GPP) of six Greater Mekong Subregion countries (Cambodia; Lao PDR; Myanmar; Viet Nam; Thailand; and Yunnan Province and Guangxi Zhuang Autonomous Region, China) by population growth, capital growth, and dummy variables for infrastructure. The analytical results show the significant effects of road transport growth on passengers and cargo, of the economic corridor on GPP growth, and of economic corridors on the import value of electric and transport machinery. Taguchi and Lar (2015) show the reduction of Viet Nam in the service-link cost and its integration into international production network, as well as the immature integration of Cambodia, Lao PDR, and Myanmar because of their higher service-link costs by logistics performance index of the World Bank, using import and export data of machinery in Thailand. The effects of road infrastructure on FDI have not yet been determined using positive analyses. I therefore analyse the effects using econometrics.

The model to estimate FDI is expressed as follows:

$$\textbf{Number of FDI Approvals}_{i,j} = \alpha\ \textbf{Real GDP}_{j} + \beta\ \textbf{Distance from Hanoi}_{i} + \gamma\ \textbf{Expressway Dummy}_{i,j} + \varepsilon_{i,j} \qquad (1)$$

or

$$\textbf{Amount of FDI Approvals}_{i,j} = \alpha\ \textbf{Real GDP}_{j} + \beta\ \textbf{Distance from Hanoi}_{i} + \gamma\ \textbf{Expressway Dummy}_{i,j} + \varepsilon_{i,j} \qquad (2)$$

The subscript *i* represents 25 provinces in the Red River Delta and in the Northern Midland and Mountainous Region, and of Nghe An and Thanh Hoa provinces on the way to Vientiane. The subscript *j* represents years, from 2001 to 2016. The number and the amount of FDI approvals (US dollars) is based on the General Statistics Office of Viet Nam. The amount of FDI is deflated by the deflator of

capital formation based on World Development Indicators. Real GDP is also based on World Development Indicators. The expressway dummy, D1, is 1 where the expressway has been completed and 0 where the expressway does not yet exist. For example, the Phap Van–Ninh Binh Expressway was completed on 30 June 2012, so D1 is 0 from 2001 to 2011, 1 from 2013 to 2016, and 0.505464 (185 days from June 30 to December 31 / 366 days) in 2012. The effects of the expressways' development did not continue and were temporary. The positive growth of the number and amount of FDI continues 1.3 years on average after road improvements, based on cases in the Greater Mekong Subregion (Ishida, 2018). So D2 is defined as another expressway dummy variable with fade-out effects. In Ninh Binh Province, D2 was 1 in 2013, 1/2 in 2014, 1/3 in 2015, and 1/4 in 2016, with inverses of time trend.

The dataset is panel data composed of 27 provinces and 16 years. In the analyses, the model is estimated with the pooled data model, the fixed effect model, and random effect model. The fitting of the models between the pooled data model and the fixed effect model is evaluated by the redundant fixed effects test, and that of the models between the fixed effect model and the random effect model is evaluated by the Hausman test.

Table 3.3 summarises the key statistics. Table 3.4 shows the estimated results in cases where the dependent variable is the number of FDI. Table 3.5 shows those in cases where the dependent variable is the amount of FDI. In accordance with the redundant fixed effects test and the Hausman test, the fixed effect models are evaluated as the most appropriate in all four cases. In the case of the fixed effect models where the dependent variable is the amount of FDI with fade-out effects, the dummy variable of the expressway is significant at 5%. In other words, the amount of approved FDI could be US$296.3 million for the next year in the province where the expressway is completed. In other cases of the fixed effect model, the dummy variables are not significant and unexpected signs are shown in the case of the number of FDI approvals. However, the coefficients of all the pooled data model for the number and amount of FDI approvals are significant at 1%, and those of the random effect model for the amount of FDI are also significant at 5% or 1%. These positive effects of the expressway dummy variable might be absorbed by the provincial dummy variables in the fixed effect models, which do not show statistical significance. Table 3.6 shows the coefficients of provincial dummy variables for the amount of FDI with fade-out effects and the distances from Hanoi in parentheses. Hanoi (0 km), Bac Ninh (40 km), Hai Phong (121 km), Thanh Hoa (160 km), Hai Duong (74 km), Thai Nguyen (61 km), Bac Giang (44 km), Vinh Phuc (41 km) show positive coefficients of provincial dummy variables.

Table 3.3. Summary of Key Statistics

	Observation	Mean	Min.	Max.	S.D.
Number of FDI	432	17.0	0.0	462.0	49.2
Amout of FDI (Million USD)	432	215.3	0.0	6,169.2	600.0
GDP (USD)	16 (x27)	1.09E+11	6.49E+10	1.64E+11	3.02E+10
Distance (km)	27 (x16)	163.2	0.0	455.0	119.2

FDI = foreign direct investment, GDP = gross domestic product, km = kilometre, max. = maximum, min. = minimum, S.D. = standard deviation.
Source: Author's calculations.

Table 3.4. Estimated Results of the Number of Foreign Direct Investment Approvals

	Pooled	Fixed	Random	Pooled	Fixed	Random
Constant	9.175575	-16.34176	8.131203	11.48006	-15.9039***	8.60737
	(8.123368)	(4.824539)	(11.40472)	(7.455795)	(4.805474)	(7.781093)
Real GDP	1.48E-10**	3.15E-10***	2.98E-10***	1.06E-10	3.07E-10***	2.68E-10***
	(6.97E-11)	(4.52E-11)	(4.50E-11)	(6.60E-11)	(4.42E-11)	(4.40E-11)
Distance	-0.09300***		-0.14337***	-0.08593***		-0.13433***
	(0.018059		(0.052118)	(0.016901)		(0.031560)
D1	57.8359***	-8.770691	-1.86962			
	(57.83587)	(7.029921)	(6.797415)			
D2				84.0755***	-6.24358	11.24321
(Fade-out)				(7.455795)	(6.658838)	(6.350168)
Observation	432	432		432	432	
Adjusted R^2	0.263057	0.720368		0.340239	0.738096	0.121165
Redundant		F: 30.5708***			F: 25.6163***	
Hausman			Chi^2: 0.000			Chi^2: 0.000

D1 = expressway dummy without fade-out effects, D2 = expressway dummy with fade-out effects, GDP = gross domestic product, R^2 = R-square.
Notes:
1) 'Redundant' means the result of redundant fixed effects test and 'Hausman' means the results of the Hausman test.
2) The number in parentheses is a standard error. *: 10%, **: 5%, and ***1% significant.
Source: Author's calculations.

Table 3.5. Estimated Results of Amount of Foreign Direct Investment Approvals

	Pooled	Fixed	Random	Pooled	Fixed	Random
Constant	-6.532424	-191.206	-8.05083	11.71168	-177.4302	4.903312
	(107.7179)	(94.79698)	(125.8110)	(105.1468)	(93.97117)	(115.8439)
Real GDP	3.14E-09***	3.52E-09***	3.36E-09***	2.63E-09***	3.35E-09***	3.02E-09***
	(9.25E-10)	(8.88E-10)	(8.69E-10)	(9.02E-10)	(8.64E-10)	(8.54E-10)
Distance	-0.98607***		-1.05931**	-0.86895***		-0.98364***
	(0.239470)		(0.451116)	(0.231057)		(0.376299)
D1	346.444***	193.5876	259.6389**			
	(92.31491)	(138.1304)	(117.9126)			
D2				616.189***	296.301**	443.575***
(Fade-out)				(101.9315)	(130.2137)	(115.3442)
Observation	432	432	432	432	432	432
Adjusted R^2	0.12753	0.273096	0.073843	0.169712	0.27882	
Redundant		F: 5.04079***			F: 4.07828***	
Hausman			Chi^2: 0.000			Chi^2: 0.000

D1 = expressway dummy without fade-out effects, D2= expressway dummy with fade-out effects, GDP = gross domestic product, R^2 = R-square.

Notes:

1) 'Redundant' means the result of redundant fixed effects test and 'Hausman' means the results of the Hausman test.

2) The number in parentheses is a standard error. *: 10%, **: 5%, and ***1% significant.

Source: Author's calculations.

Therefore, with the expressway's development, FDI can at least temporarily increase, but as the pooled data model and random effect model have shown, the effects of attracting FDI depreciate with distance from Hanoi. Based on the estimated coefficients, being 100 km away from Hanoi will decrease 9–14 FDI approvals or US$ 86.9–105.9 million.[7] Provinces that show positive coefficients of the provincial dummy variables in Table 3.6 are not so far from Hanoi. Thanh Hoa is the farthest amongst the provinces that show positive coefficients. This is partly because projects that need a large amount of investment capital, such as a petrochemical refinery and a power plant, have been implemented in Nghi Son, which is 212.1 km from Hanoi. Although Thanh Hoa is far from Hanoi, it is a frontier area

[7] The coefficients of Distance in the 1st and 3rd column of Table 3.4 are –0.093 (absolute value is minimum) and –0.14 (maximum), respectively. This means that the number of FDI will decrease by 0.093 and by 0.14 with 1km away from Hanoi. In case of 100km away from Hanoi, it will be 9 and 14, respectively. The coefficients of 4th and 3rd column of Table 3.5 are –0.86895 (minimum) and –1.05931 (maximum). The unit of the amount of FDI is US$1 million . Hence, the amount will decrease US$86,895 and US$105,931 with one km. In case of 100km away from Hanoi, the number can be US$86.9 million and US$105.9 million.

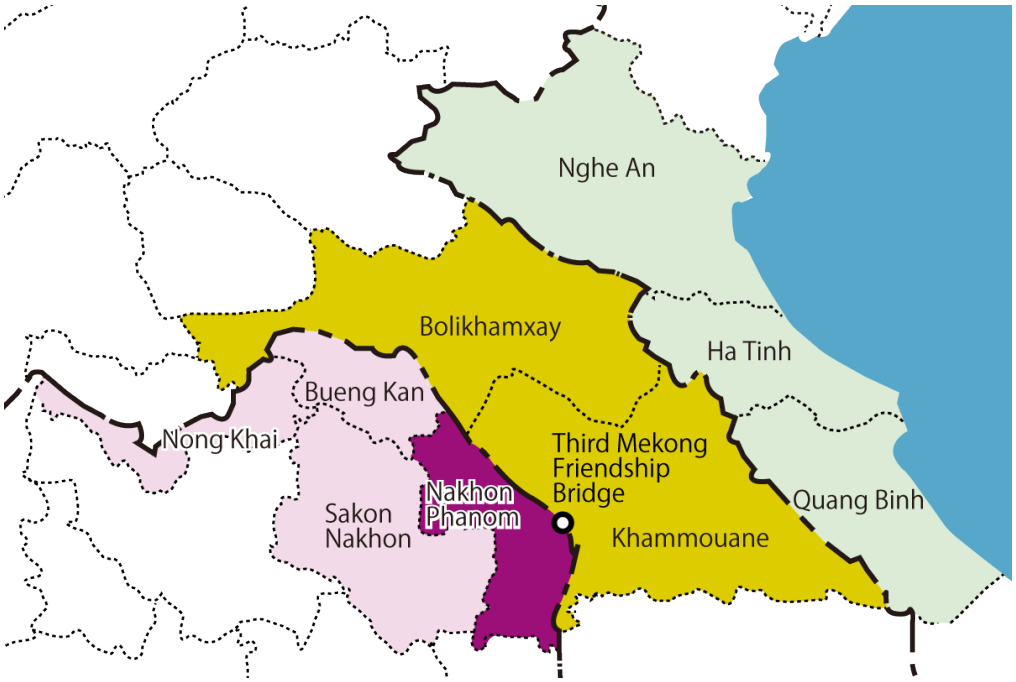
that can attract FDI such that the coefficient is positive. If these results are applied to Lao PDR, the frontiers that could attract FDI are Paksan, the capital of Bolikhamxay Province, or Vieng Kham, the T-junction of NH No. 13 with NH No. 8 (around 240 km from Vientiane) even though the recommended route of VHE does not pass Vieng Kham. This estimate coincides with future traffic volume projected by JICA (2018). In the mountainous area, which is more than 300 km from Hanoi and Vientiane near the border between Lao PDR and Viet Nam, planting agricultural products such as high-value-added vegetables and promoting tourism could be profitable.

Table 3.6. Example of Coefficients of Dummy Variables (Fixed effect model for amount of foreign direct investment with fade-out effects)

Province	Coefficient	Province	Coefficient
Lao Cai	-184.9886	Nghe An	-74.5932
Yen Bai	-219.0507	Thai Nguen	195.5134
Phu Tho	-194.0448	Bac Kan	-186.4580
Vinh Phuc	11.0982	Cao Bang	-182.7907
Ha Noi	882.8110	Quang Ninh	139.3025
Hung Yen	-28.0658	Thai Binh	-164.7337
Hai Duong	211.8722	Nam Dinh	-139.1644
Hai Phong	492.9790	Ha Giang	-184.3778
Bac Ninh	518.7079	Tuyen Quang	-177.8832
Bac Giang	32.1531	Dien Bien	-187.0208
Lang Son	-170.8994	Lai Chau	-186.8199
Ha Nam	-124.4967	Son La	-175.0677
Ninh Binh	-177.6032	Hoa Binh	-156.6855
Thanh Hoa	430.3070		

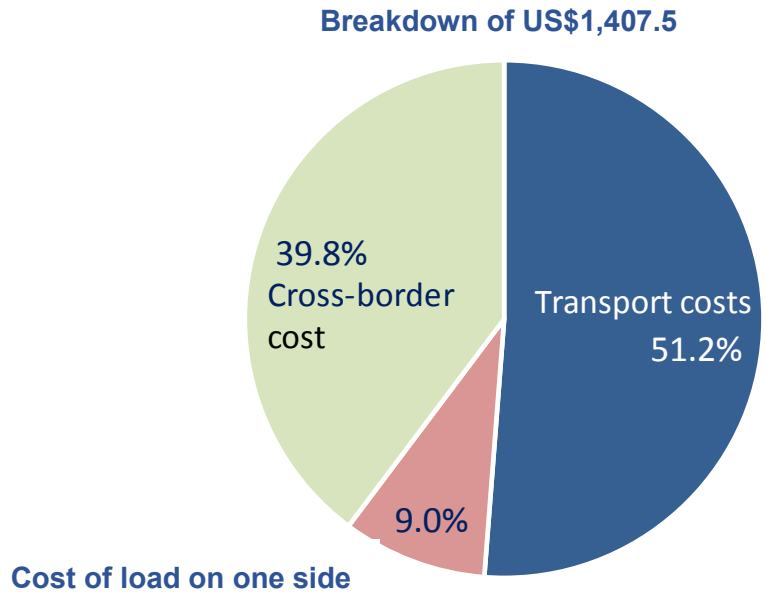
Source: Author's calculations.

Figure 3.6. Nine Provinces Party to the Friendship Agreement amongst Lao PDR, Thailand, and Viet Nam



Source: Author.

Figure 3.7. Breakdown of Logistics Cost between Bangkok and Vientiane



Source: IDE–JETRO (2017).

6. Recommendations and Challenges

Friendship agreements amongst cities and provinces should be used to promote the VHE. Four provinces in Thailand (Nakhon Phanom, Sakhon Nakong, Nong Khai, and Bueng Kan); two in Lao PDR (Bolikhamxay and Khammouang); and three in Viet Nam (Nghe An, Ha Tinh, and Quang Binh) meet twice a year to discuss trade, investment, education, and tourism. Originally, when the third Mekong Friendship Bridge was being planned, Nakhon Phanom Province, the two Lao PDR provinces, and the three Viet Nam provinces established friendships. At the opening ceremony of the Third Mekong Bridge on 11 November 2011, three other provinces in Thailand joined the friendship agreements.[8] Other provinces in the three countries should be invited to join. Vientiane and Hanoi signed an agreement of friendship on 22 December 1978 and agreed to friendship city cooperation on 14 July 1987 (Institute of Developing Economies, 1979; Kimura 1988).

One challenge is to reduce cross-border transport cost. The Institute of Developing Economies, Japan External Trade Organization (2017) conducted a study, *Logistics Cost in Lao PDR,* in 2016–2017. It estimated the cost of transporting a 20–40-foot container at US$1,407.50, of which pure transport cost was US$721.00 (51.2%), cross-border cost US$559.50 (39.8%), and cost of 'load on one side' US$127.00 (9.0%). The customs clearance fee for the Lao PDR side was US$200–217, and for the Thailand side US$133–150. To move an empty container over the border, a forwarder has to pay US$50 to Lao PDR customs and US$17 to Thailand customs. If the customs authorities of Lao PDR and Viet Nam charge cross-border forwarders the same kind of fees, transport operators may be discouraged.

Regarding 'load on one side', when a manufacturing firm in Vientiane exports products to a third country via Laem Chabang Port, for instance, a shipping firm, the owner of the container, requests the manufacturing firm to transport an empty container to Vientiane. When a Lao PDR manufacturing firm imports parts and components from a third country via Laem Chabang Port, the manufacturing firm must also transport an empty container to Laem Chabang Port. This is because a container is easily damaged, and it becomes difficult for the shipping firm to determine which consigner damaged the container if the consigners are different on the way to the destination and on the way back. Shipping

[8] This survey result is a part of a research project, Greater Mekong Subregion Economic Corridors Focusing on Human Connectivity, supported by a Grant-in-Aid for Scientific Research (C) of Japan Society for the Promotion of Science, Grant Number JP26360036.

firms, therefore, ask consigners to follow this rule. Transporting an empty container over 693 km between Laem Chabang and Vientiane, however, is a burden for a consigner in Lao PDR.

A solution is to establish an inland container depot (ICD) at Vientiane. A manufacturer can bring a container back to the ICD, a staff member of the shipping firm can then check the container for damage, then another manufacturer can use the container to export to a third destination. Even if such an ICD were established, however, not all the issues related to 'load on one side' could be solved because of the trade imbalance between Lao PDR and Thailand. Lao PDR imports more than it exports and empty containers will pile up at the ICD. In that case, the shipping firm has to bring the container back to Laem Chabang Port. If the VHE is developed, the container could be transported to Hai Phong or Lach Huyen Port, improving the situation.

7. Concluding Remarks

This paper examines the VHE's potential. The first section discusses whether the VHE can be substituted with the connectivity between Vientiane and Bangkok or Laem Chabang Port. The existing national highway to Lach Huyen Port from Vientiane is around 200 km longer than that to Laem Chabang Port. The distance to the border gate of Nampao–Cau Treo border from Vientiane is 368 km, much farther than to the Tha Na Laeng–Nong Khai border, which is only 19 km away. Of total Lao PDR exports in 2017, those to Viet Nam comprised 10.4%, less than those to Thailand (42.6%). Of total Lao PDR imports, those from Viet Nam comprised 9.8%, also less than those from Thailand (59.1%). It is not easy to draw an optimistic picture, considering these situations.

Lao PDR's trade with Pacific island countries is less than that with Europe and India. This situation can be changed by improving access to Lach Huyen Port via the VHE. As of 2017, the number of tourists visiting Lao PDR has been increasing; their numbers could increase even more with the VHE. Tourists from north-eastern Thailand to northern Viet Nam, and from central Viet Nam to Vientiane and Thailand may also increase once the VHE is developed. Lao PDR should strategically promote trade with the Pacific island countries and tourism targeting people in north-eastern Thailand and central Viet Nam.

Viet Nam's experience in developing its expressway network suggests the VHE's potential. Planting vegetables and fruits in mountainous areas should be promoted, as should attracting FDI to Paksan.

Foreign investors will be encouraged to set up factories once the 5th Mekong Friendship Bridge between Paksan and Bueng Kan is built and roads in Thailand to Bangkok are improved. The potential of the VHE can be enhanced by deepening and expanding friendship agreements amongst cities and provinces. Finally, cross-border costs, including customs clearance, should be reduced.

References

Andersson, M. and R. Banomyong (2010), 'The Implications of Deregulation & Liberalization on the Logistics Service Industry in Lao PDR', *International Journal of Economics*, 128, pp.68–76.

Fujimura, M. (2018), 'Evaluating the Impacts of Cross-Border Transport Infrastructure in the Greater Mekong Subregion: Three Approaches', in N. Yoshino, M. Helble, and U. Abidhadjaev (eds.), *Financing Infrastructure in Asia and the Pacific: Capturing Impacts and New Sources*. Tokyo: Asian Development Bank Institute, pp.296–329.

Institute of Developing Economies, Japan External Trade Organization (IDE–JETRO) (2017), *Logistics Cost in Lao PDR: Policy-Oriented Research Project Report.* Tokyo: IDE–JETRO. http://www.ide.go.jp/library/Japanese/Event/Reports/pdf/20170224_finalreport.pdf (accessed 15 February 2019).

Institute of Developing Economies (1979), 'Indochina in 1978', *Analysis of Current Affairs in Asia 1979* [in Japanese], Tokyo: Institute of Developing Economies 1978, pp.231–72.

Ishida, M. (forthcoming), 'Road Infrastructure Development of the Three Economic Corridors of the Mekong Region' (in Japanese), in V.T. Tran and S. Karikomi (eds.), *Asian Dynamism and Mekong River Basin Development* (in Japanese). Tokyo: Bunshindo.

JICA (2010), *The Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS 2), North–South Expressway Masterplan Final Report*. Tokyo: JICA.

JICA (2018), *Data Collection Survey for Enhancing Connectivity in Asia Region*, Final Report. Tokyo: JICA. http://open_jicareport.jica.go.jp/pdf/12319620.pdf (accessed 15 February 2019).

Keola, S. (2013), 'Impacts of Cross-Border Infrastructure Developments: The Case of the First and Second Lao–Thai Mekong Friendship Bridges', in M. Ishida (ed.), *Border Economies in the Greater Mekong Subregion*. London: Palgrave Macmillan, pp.163–85.

Kimura, T. (1988), 'Cambodia and Laos in 1987', *Analysis of Current Affairs in Asia and Middle East 1988* (in Japanese). Tokyo: Institute of Developing Economies, pp.229–54.

Kimura, T. (2000), 'Laos in 1999' (in Japanese), *Analysis of Current Affairs in Asia in 1999* (in Japanese). Tokyo: Institute of Developing Economies, pp.245–60.

Savada, A. M., ed. (1994), *Laos: A Country Study*. Washington, DC: US Government Printing Office.

Taguchi, H. and N. Lar, (2015), 'Fragmentation and Trade of Machinery Parts and Components in Mekong Region', *The Singapore Economic Review,* 60(5), pp.1–21.

Chapter 4

Maximisation of Economic Benefits and Industrial Development Strategies through the Hanoi–Vientiane Expressway: The Case of Lao PDR

Leeber Leebouapao

Sthabandith Insisienmay

1. Introduction

Since gaining independence in 1975, Lao PDR has instituted several economic reforms, notably the New Economic Mechanism, and adopted an open and more liberated market economy. International economic cooperation began after the adoption of the New Economic Mechanism in 1986, and the government's vision, strategy, and national socio-economic development plans have determined the terms of regional and international integration. Lao PDR's Socio-economic Development Vision, 2030 anticipates the country's economic and social development progress during 2015–2030 'to be able to broadly and deeply integrate and connect with the region and the world' (MPI, 2016). To this end, the 10-Year Socio-Economic Development Strategy, 2015–2025 includes a sub-strategy on improving regional and international integration and connectivity in which the focal tasks are to upgrade and develop transport infrastructure and improve logistics services (Box).

Box: Sub-Strategy on Improving Regional and International Integration

The sub-strategy on improving regional and international integration and connectivity under the 10-Year Socio-Economic Development Strategy, 2015–2025 focuses on the following areas:

- implementing international cooperation commitments and mobilising financial resources in terms of foreign direct investment and overseeing development assistance;
- participating in regional and international integration processes, particularly in the framework of the Association of Southeast Asian Nations (ASEAN) Economic Community; ASEAN+6 (Australia, China, India, Japan, Republic of Korea, and New Zealand); the Greater Mekong Subregion; and the World Trade Organization;

- creating a favourable investment and business environment and mobilising quality foreign direct investment, accompanying expertise, transferable technology, and export market;
- developing local enterprises to enable them to integrate into regional and global supply chains; and
- upgrading and developing road, railway, and aviation infrastructure and improving logistics services to make them convenient, safe, and modern.

Source: Government of Lao PDR (2016), 10-Year Socio-Economic Development Strategy, 2015–2025.

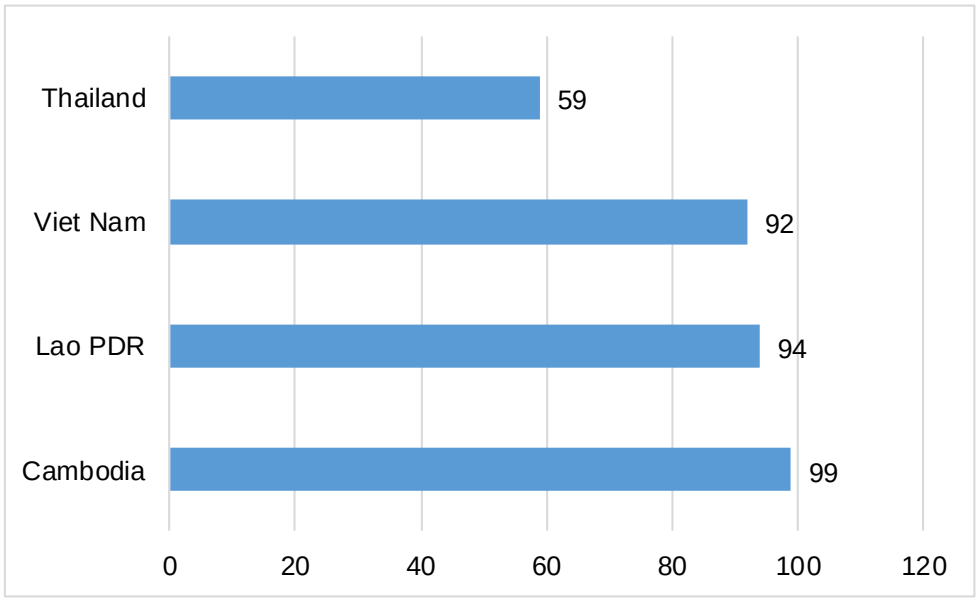
To promote trade and foreign direct investment, it is widely acknowledged that countries that are landlocked, a condition that was once generally considered an impediment to economic development, should instead be viewed as 'land-linked' in the context of promoting regional economic integration and connectivity. Recognising this opportunity, the Government of Lao PDR has promoted regional and international economic cooperation to economically integrate and connect the country with its neighbours and with global value chains.

The launch of the East–West Economic Corridor (EWEC) integration scheme during the 8th Greater Mekong Subregion (GMS) Ministerial Meeting in 1988 provided momentum for integration. As one of the flagship initiatives of the GMS, the corridor adopted a holistic approach to developing a cost-effective way of instituting an efficient transport system for moving goods and people in the subregion, while simultaneously developing telecommunications and energy infrastructure, tourism, and a policy and regulatory environment that facilitates and encourages private sector development. The corridor traverses and links many member countries of the Association of Southeast Asian Nations (ASEAN), passing though Da Nang, Dong Ha, Thua Thien Hue, and Quang Tri in Viet Nam (271 kilometres (km)); Dansavanh and Savannakhet in Lao PDR (229 km); Mukdahan, Kuchinarai, Kalasin, Khon Kaen, Phitsanulok, Mae Sot, and Tak in Thailand (620 km); and Mawlamyline and Myawaddy in Myanmar (200 km). This provides opportunities for Lao PDR to access regional markets and attract more investment from neighbouring countries.

Located in the centre of GMS and sharing borders with all GMS countries, Lao PDR has the potential to create a transport hub (ERIA, 2016). Nevertheless, the mountainous topography and lack of infrastructure are obstacles to further development and the fulfilment of this potential, and connectivity within the country and with the region remains a major challenge. Lao PDR has poorer-quality roads than Thailand and Viet Nam (Figure 4.1), and, unlike its neighbours, its roads do not meet weight

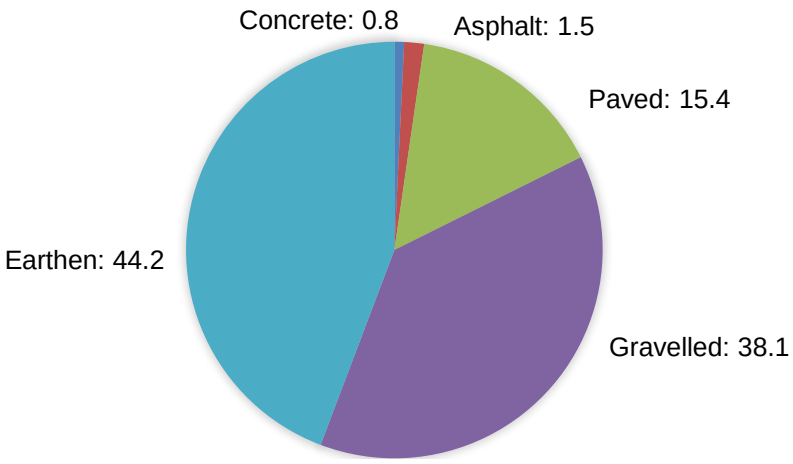
standards. The highway security system is inadequate and border facilities do not accord with international standards (MPWT, 2015). Moreover, more than 80% of the roads are earthen or gravelled, while concrete, asphalt, and paved roads make up less than 20% of the total length (Figure 4.2). Some sections, particularly those connecting urban and rural areas, are impassable in the rainy season.

Figure 4.1: Road Quality Ranking, 2018



Note: Figures indicate the rank amongst 137 countries. Economies are ranked on their quality of road from 1 to 137.
Source: The Global Competitiveness Report, World Economic Forum.

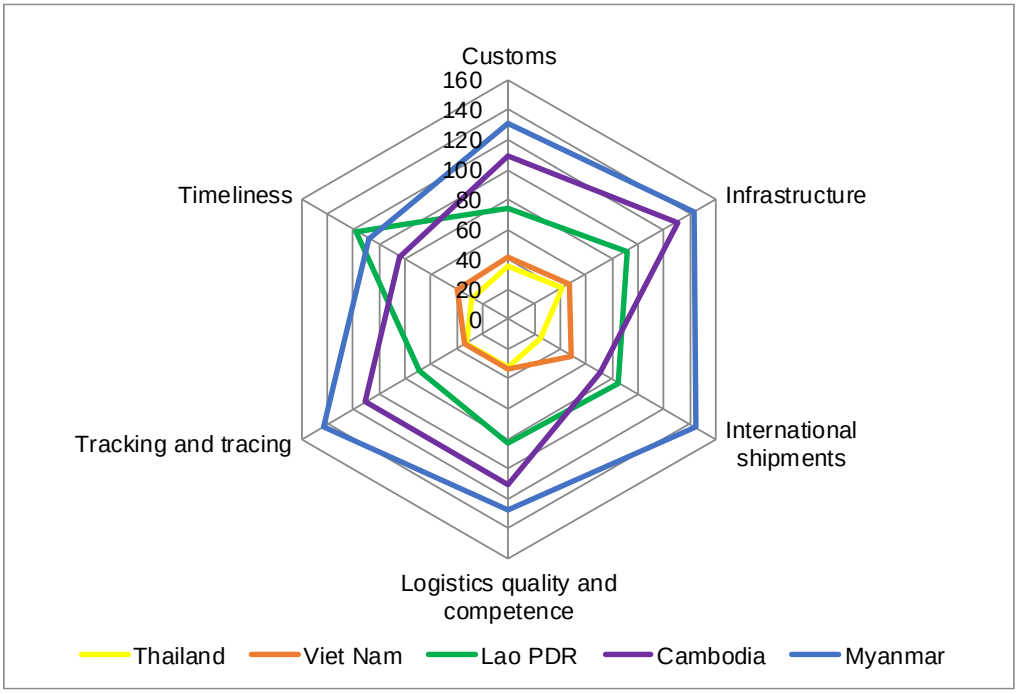
Figure 4.2: Road Types, 2016 (%)



Source: Ministry of Public Work and Transport, Lao PDR.

Many improvements are also needed in areas related to road infrastructure. Although Lao PDR has improved its ranking in the Logistics Performance Index, which measures the physical movement of goods within and across borders, it still ranks lower than Thailand and Viet Nam in all areas (Figure 4.3). It ranks lower than Cambodia and Myanmar for the timeliness of shipments arriving at their destination in the specified delivery time. It also ranks lower than Cambodia in the ease of arranging competitively priced shipments, as represented by the international shipment index.

Figure 4.3: Logistics Performance Index, 2018



Source: Logistics Performance Index, World Bank.

The transport and logistics sector is therefore amongst the sectors prioritised for support. The ongoing construction of the Lao PDR–China railway, as well as several planned highways connecting the country to the region, particularly the Vientiane–Hanoi Expressway (VHE) under the EWEC scheme, and the proposed construction of friendship bridges across the Mekong River are significant steps in this direction.

As well as creating a smooth link between Vientiane and Hanoi, the development of the VHE is seen as a missing part of Hanoi–Bangkok connectivity, which will provide economic benefits to the economy of the entire Mekong region through increased international trade. The potential trade and investment benefits from this expressway are therefore expected to be felt by Thailand and Viet Nam at the far ends

of the VHE route in addition to the Lao PDR. This paper focuses mainly on a case study of Lao PDR, but it will also consider the potential qualitative benefits to be gained by Thailand and Viet Nam.

Section 2 provides more details of the transport plan and current development in the context of regional and international economic integration and connectivity. Section 3 qualitatively assess the potential economic development benefit for Lao PDR of the transport infrastructure connectivity provided by the VHE. Section 4 provides concluding remarks.

2. Transport-Related Infrastructure Development and the Planned Vientiane–Hanoi Expressway

As a landlocked country, land transport is the most important mode of transport in Lao PDR. Land transport makes up almost 80% of total transport, river transport 18%, and air transport 2%. Effective land transport infrastructure development is also crucial to overcome the constraints of low population density and hilly terrain; provide an efficient connection between the northern, central, and the southern economic centres of the country; and connect each centre with neighbouring road networks. For this reason, the Eighth Five-Year National Socio-Economic Development Plan, 2015–2020 (Outcome 1, Output 7); the strategy on regional and international integration, 2016–2025 of the Ministry of Public Works and Transport (MPWT); and the national and sector plans all emphasise two modes of land transport infrastructure development: roads and highways, and railways.

2.1 Roads and highways

The National Socio-Economic Development Plan focuses on improving and expanding existing roads such as national roads, roads linking provinces to districts and villages, and ASEAN main roads. This is in line with the MPWT's Strategy on Regional and International Integration, 2016–2025, under which the MPWT's focal tasks are to upgrade existing national roads to regional highways and to construct road networks and expressways. The study, survey design, and construction of the VHE – the shortest connecting road between Vientiane Capital and Hanoi – is also one of the MPWT's focal tasks specified in the 2016–2020 strategy on road transport.

The VHE is a flagship initiative of the governments of Lao PDR and Viet Nam, and the two countries have requested financing cooperation from the Government of Japan for its construction. In response to this request, the Japan International Cooperation Agency (JICA) decided to collect data and undertake a comprehensive analysis of the VHE. The JICA study proposed for government consideration an alternative route that is less costly and impinges less on the national forest reservation. According to the study, the first phase of construction, in 2021–2026, will be from Vientiane Capital to Ban Viengkham. The density of vehicles will exceed 20,000 a day during this period. The last phase, in 2028–2040, will be from Ban Viengkham to the Viet Nam border. Vehicle density will exceed 10,000 a day during this period.

To capitalise on the development of the VHE, existing roads and highways in Lao PDR need to be upgraded. Eight ASEAN highways (the AH3, AH11, AH12, AH13, AH15, AH16, AH131, and AH132), with a total length of 2,835 km, need to be upgraded to meet ASEAN standards by 2025 in compliance with the Master Plan on ASEAN Connectivity, 2025. However, the most important connecting main roads to undergo upgrading are the AH12 (also known as the NR13 North), and the NR13 South, which connect the expressway to the northern and southern parts of the country. At the same time, the ongoing construction of the expressways from Vientiane Capital to Vangvieng (part of the 460 km expressway from Vientiane Capital to the Chinese border) will link VHE to China in the north. Construction is divided into four phases. The first phase, from Vientiane Capital to the town of Vangvieng, in Vientiane Province, is under construction and expected to be completed by 2020. The second phase, from Vangvieng to Luangprabang Province will run from 2021 to 2024. The third phase, from Luangprabang Province to Oudomxay Province, will run from 2024 to 2027. The last phase, from Odomxay Province to the town of Boten, in Luangnumtha Province, will run from 2027 to 2030.

2.2 Railways

Based on the MPWT's strategy, seven railway projects with total length of 1,594 km are planned for construction by 2030. These railway lines will run from (i) Vientiane Capital to the city of Nongkhai, in Thailand; (ii) the town of Boten, on the Chinese border, to Vientiane Capital (the Lao PDR–China Railway); (iii) Vientiane Capital to the town of Thakhaek to Mugla; (iv) Savannakhet to the town of Lao Bao on the Viet Nam border; (v) Thakhaek via Savannakhet and Pakse to Vangtao (on the Thai border);

(vi) the city of Parse to Veunkham town on the Cambodian border; and (vii) Vientiane Capital, connecting the Lao PDR–China Railway to the city of Nongkhai in Thailand. To date, only the project connecting Boten to Vientiane Capital (the Lao PDR–China railway) is under construction.

The Lao PDR–China railway project is a joint investment of the governments of China and Lao PDR. The Government of China will invest 70% of the $6 billion required and the Government of Lao PDR will contribute the remaining 30%. Construction began in December 2016 with the boring of tunnels and construction of bridges at various points along the route. By the end of 2018, about 55.7% of the project's total works had been completed, including 69 tunnels with a total length of 126,544 metres and 96 bridges. This railway will provide the VHE with a northern link. More importantly, as part of the Kunming–Singapore or Pan-Asian railway network concept, and more broadly, China's One Belt, One Road Initiative, this planned railway network will connect Kunming and Singapore via various routes passing through Cambodia, Lao PDR, Myanmar, Thailand, and Viet Nam.

The other planned railways are still far from realisation. The ongoing Savannakhet–Lao Bao Railway Project, privately funded by a Malaysian company and Government of Lao PDR, for example, was approved in 2012 but has only reached the preliminary stage of installing corridor posts along the route.

2.3 Bridges

The Government of Lao PDR also plans to construct new bridges across Mekong River, including bridges connecting Lao PDR and Thailand's major provinces, such as between the towns of Paksan and Bueng Kan, Ban Paktaphan and Khemarath, and Vientiane Capital and Nongkhai (a railway bridge). The design and determination of the location of the Paksan–Bueng Kan bridge, which is closest to the VHE, were completed in 2018.

2.4 Dry ports

Other important factor needed to enhance the benefits of road infrastructure is the development of dry ports. The first dry port in Lao PDR was established at the Savan Park Zone C in the Savan–Seno Special Economic Zone (SEZ) in 2017. This is the only port in full operation so far. There are plans to

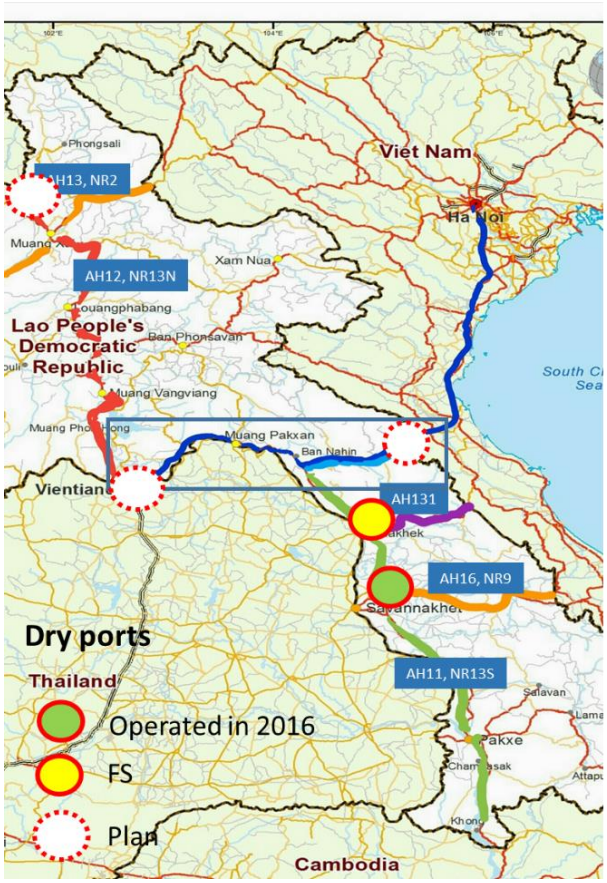
develop dry ports in the provinces of Bolikhamxay, Champasack, Khammuan, Luangnamtha, and Vientiane.

For Vientiane, the development of a dry port at Thanaleng, close to the first friendship bridge, will be further delayed as there is a need for an additional feasibility study following the completion of the JICA-supported pre-feasibility study by Nippon Express Logistics Co. The memorandum of understanding to conduct the additional study is being drafted. Another dry port in the process of investment approval is in the Vangtao Economic Zone in Champasack Province. JICA has already completed a feasibility study for this project. However, it is clear from the current situation that there are not enough dry ports to support the future development of road transport infrastructure, including the VHE. There is, however, a plan to develop such infrastructure near the Lao PDR border checkpoints with Viet Nam, and these plans should be brought forward.

Figure 4.4: Planned ASEAN Highways, Railways, and Bridges

AH = ASEAN highway, ASEAN = association of Southeast Asian Nations, NR = national road.
Source: Google Maps, modified by the author.

Figure 4.5: Dry Ports



AH = ASEAN highway, FS = feasibility study, NR = national road.
Source: Google Maps, modified by the author.

2.5 Soft infrastructure

In addition to hard infrastructure development, soft infrastructure is needed to improve the institutional framework, procedures, and logistics services related to the road sector. This is an important factor that needs to be in place to boost the benefits of the planned VHE. A great deal of effort has also been made in this area. For instance, long-term transport strategies for environmentally sustainable transport and logistics have been drafted for the government's consideration. Since 2011, the government has revised legislation to bring it more into compliance with regional and international agreements to which it is committed. This includes the road transport law, the road traffic law, the multimodal transport law, and the regulation of maximum permissible gross weight for trucks (MPWT, 2015b).

Under the framework of the GMS Cross-Border Transport Facilitation Agreement, a pilot project on a Lao PDR–Viet Nam single-stop inspection service has been implemented since December 2015 in the common control area at the Lao Bao–Densavanh International checkpoint in the provinces of Savannakhet in Lao PDR and Quant Tri in Viet Nam. The e-custom system installed by the project will simplify cross-border administrative procedures by reducing the number of documents to be filled and offices to be visited and, consequently, border-crossing time. A similar model will soon be applied in Savannakhet–Mukdahan international checkpoint at the second Lao–Thai friendship bridge at another end of the AH16 and later to other important international border checkpoints. There are also plans to strengthen the Public Works and Transport Institute and training centres to enhance heavy freight transport management and road safety management and promotion, improve the legislation in the area of road traffic, and modernise the information system to manage vehicle registration and the issuance of driving licences.

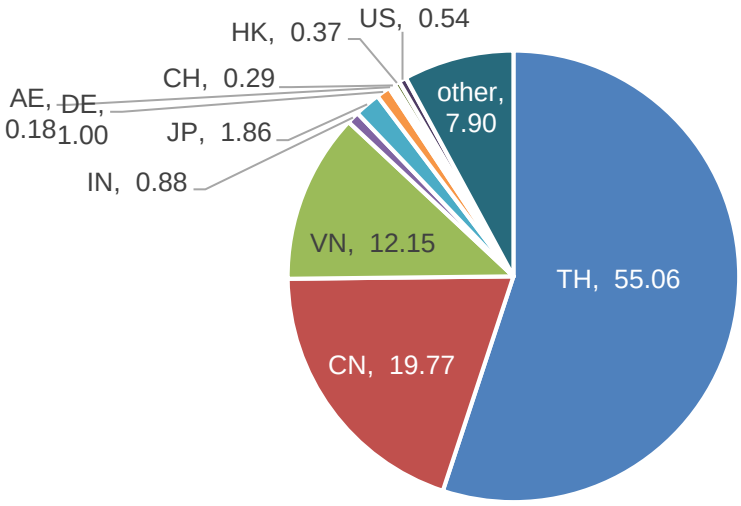
3. Potential Benefits of the Vientiane–Hanoi Expressway for Economic Development in Lao PDR

3.1. Enhancing international and transit trade

As a landlocked country, any additional good road infrastructure connecting the country with its neighbours will not only promote trade of the host country with its neighbours but will also enhance the transit trade. A study by Rajvong (2010) on the impact of Road No.3 on trade in China, Lao PDR, and Thailand showed that the establishment of the road in early 2008 doubled trans-border trade between Thailand and China from $12.6 million in 2008 to $27.1 million in 2009. A similar effect could also be expected from the development of the VHE.

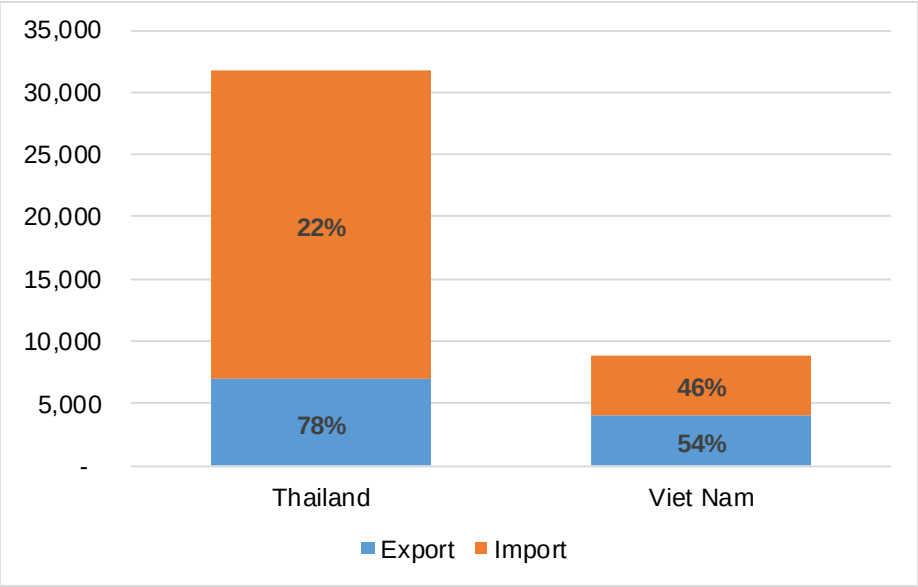
Thailand, China, and Viet Nam are the Lao PDR's top three trading partners (Figure 4.6). During 2010–2017, trade with Thailand grew at an average annual rate of 8% and trade with Viet Nam grew by 16% per year. Imports account for 70%–80% of the trade in goods with Thailand and 50% of that with Viet Nam is (Figure 4.7). Moreover, almost all the trade in goods by the two countries is conducted by inland transport. Therefore, there is no doubt that any planned expressways will facilitate and benefit not only expansion of Lao PDR's exports, but also, to a greater degree, those of Thailand and Viet Nam.

Figure 4.6: Top 10 Trade Partners, 2013–2017 (%)



AE = United Arab Emirates, CH = Switzerland, CN = China, DE = Denmark, HK = Hong Kong, JP = Japan,
TH = Thailand, VN = Viet Nam, US = United States.
Source: Author, based on data from the Ministry of Commerce and Industry, Lao PDR.

Figure 4.7: Lao PDR Trade with Thailand and Viet Nam ($ billion)

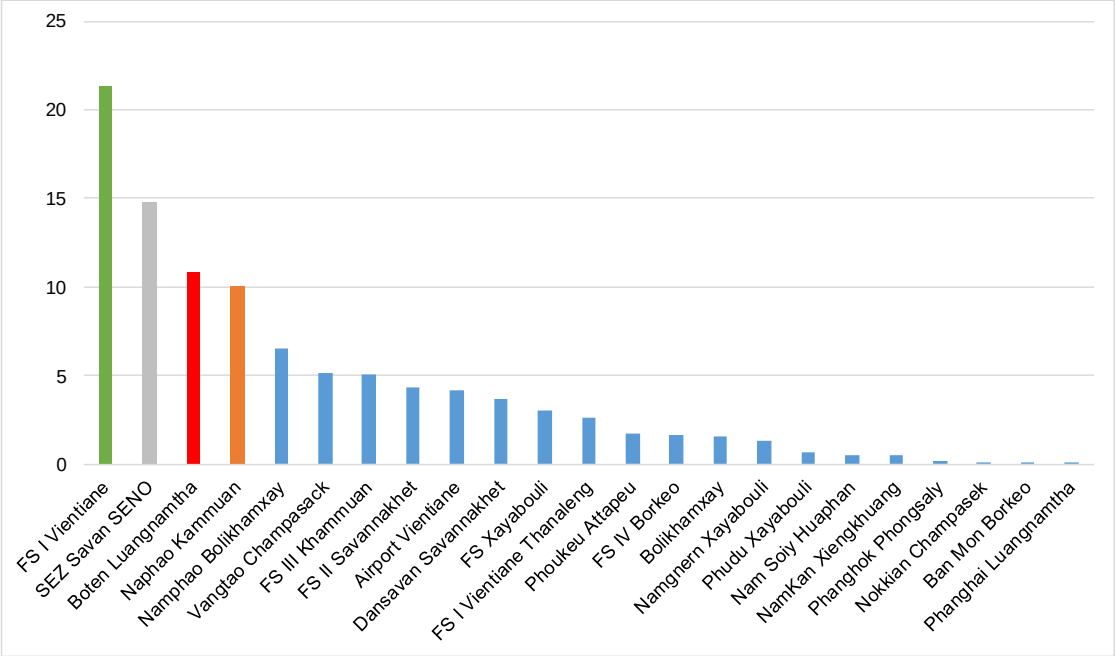


Note: Figures exclude electricity trade.
Source: Author, based on data from the custom, Ministry of Finance, 2017.

The VHE passes through two provinces: Vientiane Capital and Bolikhamxay. In 2017, Vientiane Capital had the highest trade volume amongst the provinces, followed by Savannakhet, Luangnamtha, and

Khammuan. Lao PDR trade through an international checkpoint at Bolikhamxay Province ranked fifth (Figure 4.8).

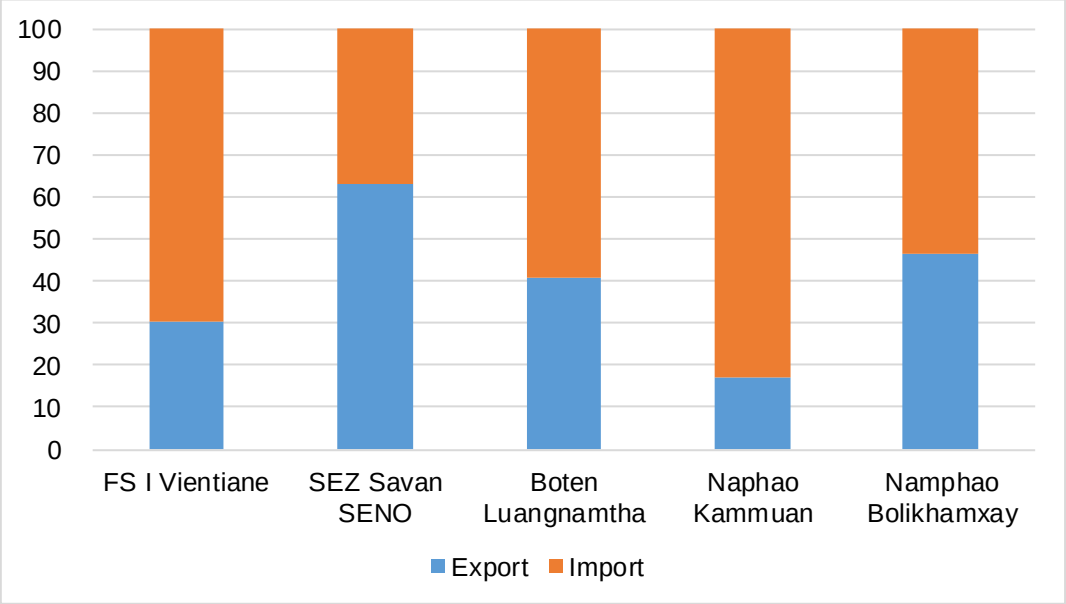
Figure 4.8: Trade Volume by Checkpoint, 2017 (%)



FS = friendship bridge.
Source: Data from the custom, Ministry of Finance, 2017.

It is clear from Figure 4.9 that the expressway from the first friendship bridge in Vientiane Capital to Namphao checkpoint at the Lao PDR–Viet Nam border will facilitate both export and import between Lao PDR and Viet Nam, especially imports from Viet Nam to Lao PDR. Most of Lao PDR's imports from Thailand enter through the first friendship bridge in Vientiane Capital, while exports make up only 30% of total trade through this checkpoint. Goods exported at the checkpoint include products such as drinks, copper, aluminium, and furniture. Imports include vehicles, construction materials, and medicines. On the other hand, Lao PDR imports mostly from Viet Nam through Naphao checkpoint in Khammuan Province and through Namphao checkpoint in Bolihamxay Province. At Namphao checkpoint, exports include white charcoal, wood products, rubber, coffee, and non-timber forest products, while imports consist mostly of motorbike parts, construction materials, and fuel.

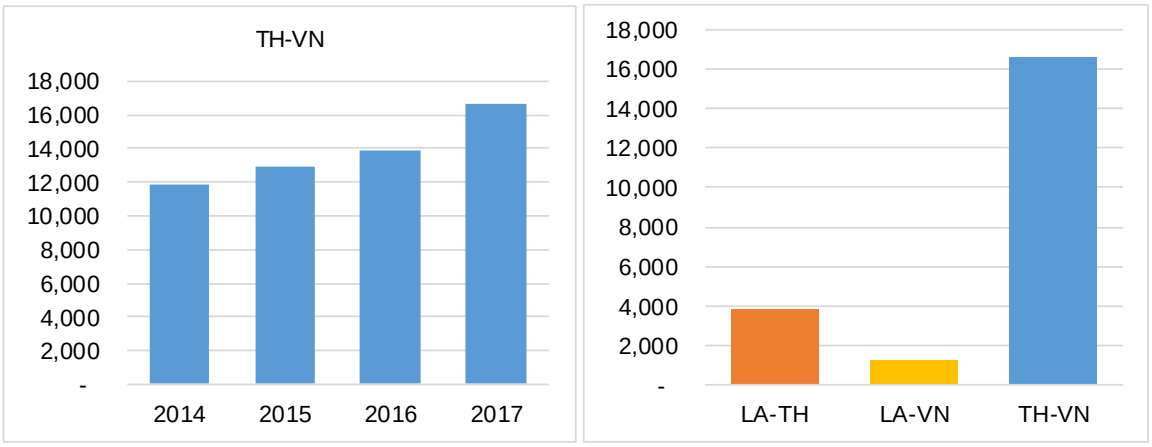
Figure 4.9: Trade through Major Checkpoints (%)



FS = friendship bridge, SEZ = special economic zone.
Source: Data from the custom, Ministry of Finance, 2017.

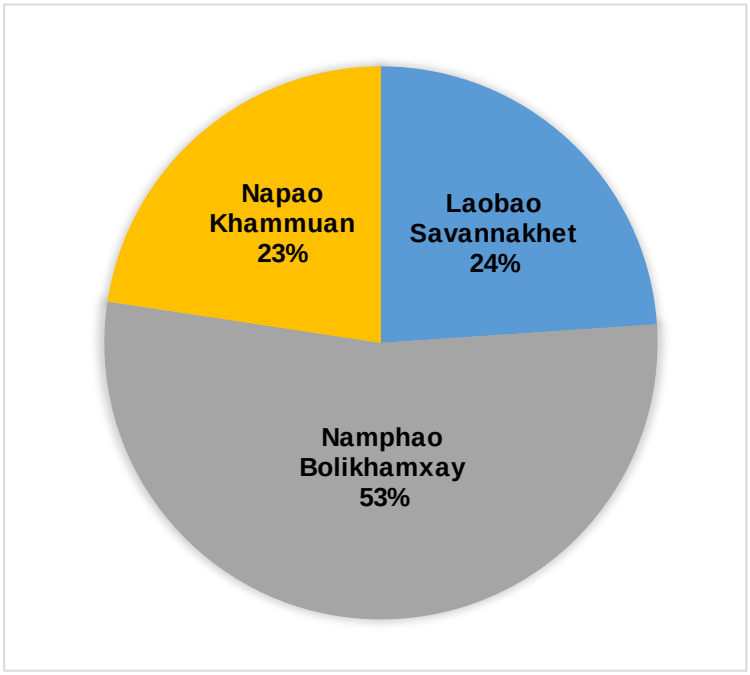
Trade between Thailand and Viet Nam has increased steadily and in 2017 was about 4 times that between Lao PDR and Thailand and 14 times that between Lao PDR and Viet Nam (Figure 4.10). Figure 4.11 shows that more than 50% of goods re-exported from Thailand to Viet Nam went through the Namphao checkpoint in Bolikhamxay Province via National Road No. 8. Thai goods re-exported through this checkpoint are mostly consumption goods and some electric products imported via the first and third friendship bridges in Vientiane Capital and Khammuan Province. The second friendship bridge in Savannakhet and National Road No. 9 to Lao Bao checkpoint in Savannakhet Province is an alternative route for the import of goods re-exported from Thailand to Viet Nam. About 90% of the goods moving through this checkpoint are consumption goods and the rest are live animals and electrical products. Thai goods are also re-exported through Asian highway No.131 to Napao traditional checkpoint in Khammuan Province. About 80% of the goods re-exported via this checkpoint are electrical products and the rest are live animals. All of the goods re-exported from Viet Nam to Thailand (most of which are consumption goods) are imported from Viet Nam via the Savan Lao Bao checkpoint, transported through National Road No. 9, and re-exported to Thailand over the second Lao–Thai friendship bridge in Savannakhet.

Figure 4.10: Trade between Thailand, Viet Nam, and Lao PDR, ($ million)



LA = Lao PDR, TH = Thailand, VN = Viet Nam.
Source: Association of Southeast Asian Nations Trade Statistics, 2017.

Figure 4.11: Goods Transit from Thailand to Viet Nam by Checkpoint



Source: Data from the custom, Ministry of Finance, 2017.

Given that trade on this route is already well established, the development of the VHE is expected to enhance Thailand's exports to Viet Nam. On the other hand, the VHE will provide an alternative route for Vietnamese goods exported to Thailand (in addition to National Road No. 9). While the transit trade between Thailand and Viet Nam is expected to increase (whether directly or indirectly through

the VHE), a better road would increase both exports from and imports to Lao PDR. However, given that Lao PDR will not be able to increase the variety and value of its exports in the very near future, and imports make up more than 70% of Lao PDR trade with Thailand, imports are likely to continue to outweigh exports.

3.2 Promoting trade from and investment in industrial estates

A region's industrial and employment base is closely tied to the quality of the transport system, including its road infrastructure. For a land-linked country, a good road, or at least roads that connect to other export gateways, such as airports or seaports, is not only necessary but crucial for foreign investment decisions in industrial estates. Lao PDR's experience with special economic zones (SEZs) began in 2003 with the establishment of the Savan–Seno SEZ under Decree no. 148/PM. A total of 12 SEZs are now in operation. In 2017, the government decided to further develop the existing SEZs and suspend the establishment of new ones.

The development of the VHE will directly involve at least five SEZs located in Vientiane Capital, all of which operate as trade- and tourism-promoting zones. Two of them – Vientiane Industrial Trade Area (VITA Park)[1] and Saysettha Development Zone[2] – play a particularly important role by serving as industrial parks. These two SEZs benefit from a direct connection to the Thai road network via the Lao PDR–Thai border checkpoints, particularly in Vientiane Capital, and have access to Bangkok harbour via the existing Thai railway from Vientiane Capital. Although there is already an established road connection for goods transport from VITA Park to Viet Nam, the SEZs will benefit from connection to the freight train station of the Lao PDR–China high-speed rail link that will soon to be completed and will provide a direct link to China's railway system to further facilitate passenger and cargo transport. Although most investors in these zones are from China, Denmark, Japan, Malaysia, Taiwan, and Thailand, with their main targeted markets overseas, 40% of the transport was conducted through Viet Nam from Vung Ang Seaport and the rest was through Thailand. All exports from Saysettha

[1] VITA Park, known as a free-trade industrial economic zone, was established on 30 October 2009. The 110-hectare park is a joint venture between the Government of Lao PDR, holding 30% of the ownership, and Nam Wei Development Co., Ltd., holding 70% ownership. So far, about 35 companies from China, Denmark, Japan, Lao PDR, Malaysia, Taiwan, and Thailand have invested a total of more than $110 million in the zone.

[2] Saysettha Development Zone was established in 2010, covering 1,000 hectares. It is a joint venture between the Government of Lao PDR and a Lao–Chinese private company. About 36 companies from China, Lao PDR, Thailand, and Malaysia have invested an aggregate of more than $1,683 million in the zone.

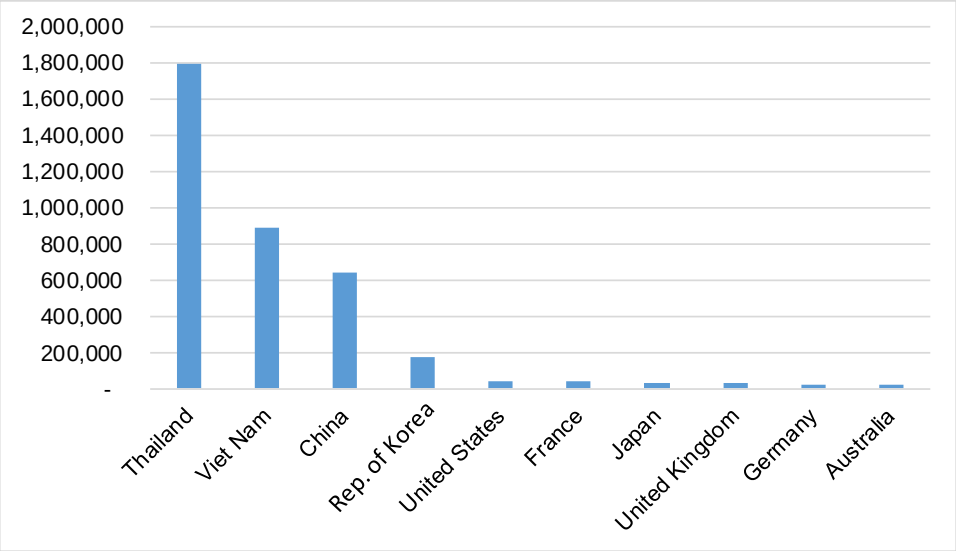
Development Zone target the Thai market or transit through Thailand to destination markets such as Hong Kong. For this zone, the VHE will provide more opportunities for investors interested in Viet Nam, whether for market access or utilisation of Vietnamese seaports.

In addition to the SEZs in Vientiane, other zones in the central part of the country, such as Phoukhyo Specific Economic Zones in Khammuan Province and Savan–Seno SEZ in Savannakhet Province, will also be able to use the VHE as an alternative route to Hanoi in the future, given that the condition of the AH131 road to Napao traditional checkpoint in Khammuan Province is worse than that of the AH15 to Naphao checkpoint in Bolikhamxay Province. Currently, there is no direct trade with Viet Nam from these two zones, although a few companies in Savan–Seno SEZ already use Viet Nam's Da Nang seaport to export to China.

3.3. Increasing the number of tourists

Long-distance travel by car on normal roads is exhausting and time-consuming. The improved road conditions of the expressway could have a substantial impact on the tourism industry by shortening travel time. Tourist arrivals in Lao PDR have increased steadily to about 4 million in 2017. The largest source market is Thailand, accounting for about 46% of international arrivals, followed by Viet Nam (23%) and China (17%) (Figure 4.12). The Republic of Korea, in fourth position, is the fastest-growing market. Lao PDR's tourism industry is less developed than that of Thailand and Viet Nam. About half of international visitors combined their visits to Lao PDR with a visit to Thailand.

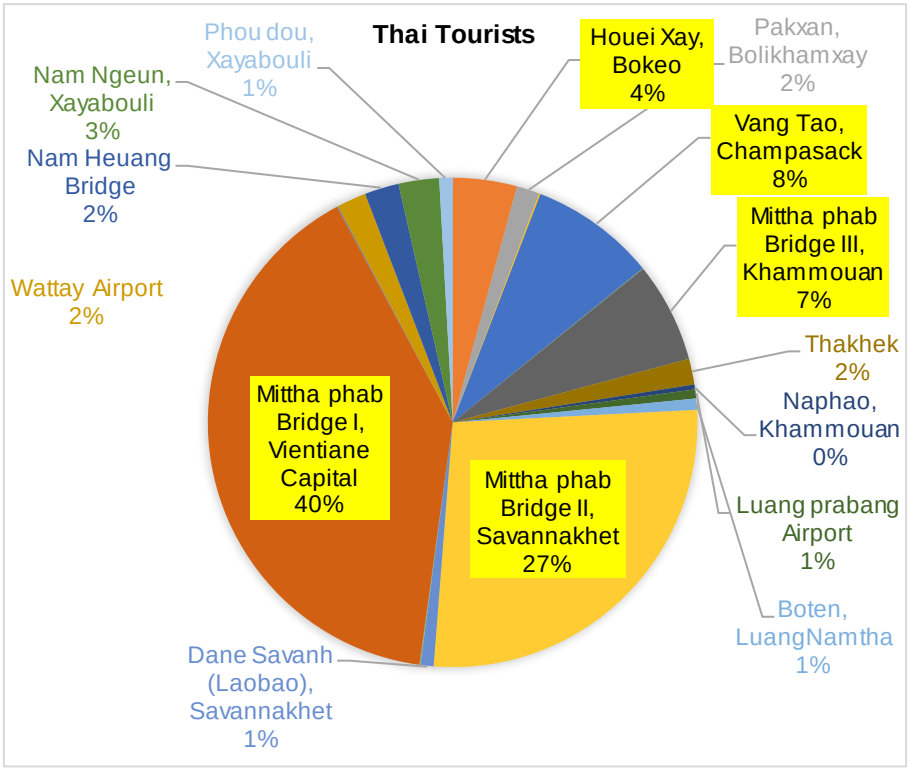
Figure 4.12: Top 10 Tourist Arrivals in Lao PDR by Source Country

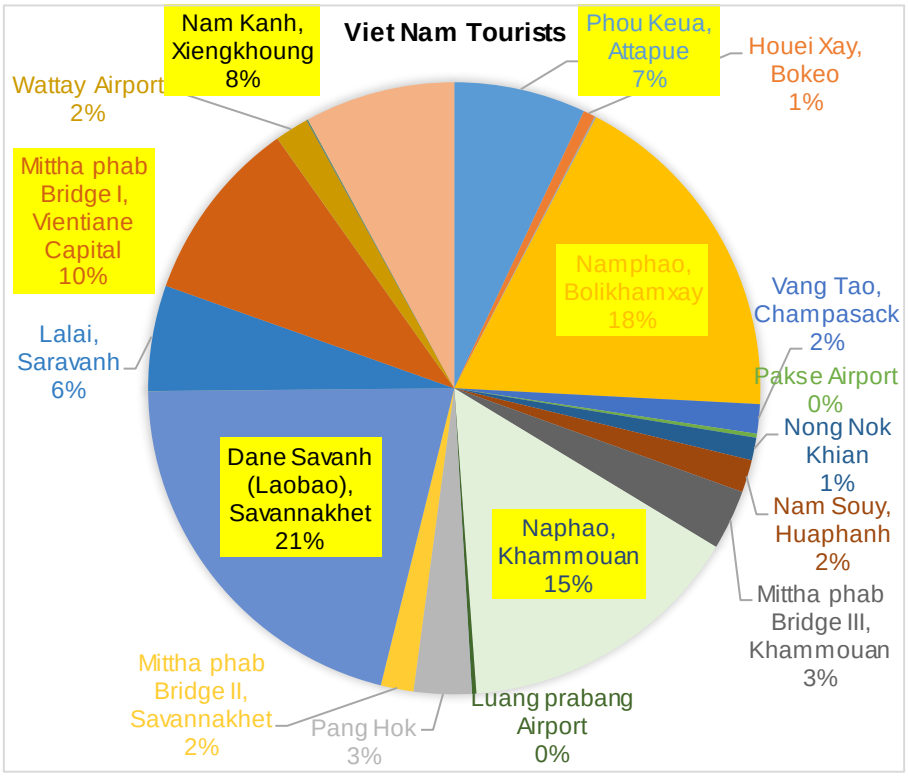


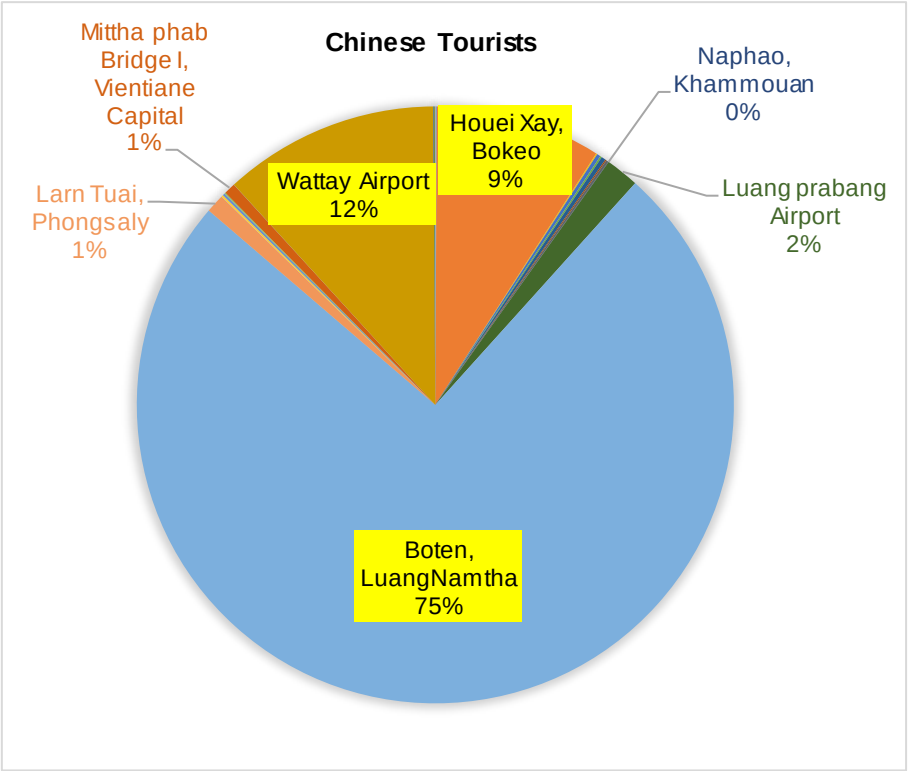
Source: Author, based on data from the Ministry of Information, Culture and Tourism, Lao PDR, 2017.

As most of the well-known tourist sites in Lao PDR are in the central and western parts of the country, road infrastructure that brings tourists from the eastern to the western parts is very important. Figure 4.13 shows the border checkpoints that the tourists from top 3 source markets (Thailand, Viet Nam, and China) used to enter Lao PDR in 2017. Thai tourists entered Lao PDR at friendship bridges I, II, and III along western parts of the border Lao PDR–Thailand border. The destinations of those entering via the first friendship bridge were Vientiane Capital, Vanvieng, and Luangprabang in the northern part of the country, so the VHE would not be so important for direct access. However, for tourists from the northeastern part of Thailand, the VHE would provide access to tourist destinations in Hanoi. For the 75% of Chinese tourists that enter Lao PDR at Boten international checkpoint in Luangnamtha Province, the Lao PDR–China railway would be a very important boost. Vietnamese tourists, on the other hand, enter Lao PDR via the checkpoints along its eastern border with Viet Nam. Namphao checkpoint in Bolikhamxay Province ranked second as a point of entry in 2017. Connecting the VHE to that checkpoint could therefore boost the number of Vietnamese inland travellers to the central and northern parts of Lao PDR.

Figure 4.13: Share of Tourists Entering Lao PDR by Port of Entry, 2017 (%)







Source: Author, data from Ministry of Information, Culture and Tourism, Lao PDR, 2017.

Plans for the development of railways and roads, including the VHE, foresee issues with the tourism industry's capacity to reap the benefits from the growing number of tourists. Lao PDR has 2,165 guesthouses and 569 hotels, with 50,600 rooms and 66,246 beds, of which less than 10% have a five-star rating. Although the number of registered tour operators more than doubled to 336 during 2009–2015, there are too few (604) active licensed tour guides to meet demand. Moreover, infrastructure and facilities to enhance access to tourist sites also need to be further developed.

3.4. Other potential benefits of the Hanoi–Vientiane Expressway

Increasing flows of goods, reliable service deliveries, and higher business profits. Travel time is expected to be shorter and travel cost lower on better roads, allowing companies to reduce their transport costs. As trucks would be able to reach their destinations without major delays, existing firms could ship goods more cheaply and improve their service as delivery schedules become more reliable. More timely and reliable deliveries would enable firms to lower their production costs and enhance productivity and profits. At the national level, the faster and cheaper movement of freight

would help make businesses in the Lao PDR more competitive in the international market. As mentioned earlier, the doubling of trading value as a result of the construction of the R3 road would also imply more profits for existing traders or companies who could ship more goods in the same amount of time.

Increasing employment and activities in other supporting industries. The VHE will generate a direct impact on employment during the construction phase. Managers, specialists, and semiskilled and unskilled labourers will also be called upon to construct new roads and resurface existing ones. Indirectly, the construction is also expected to generate jobs in many other industries. For example, highway construction will require more orders for construction materials from local companies, and these companies will then need to hire more labour to process orders and deliver materials to construction sites. Other supporting industries, such as agriculture and food processing, are also expected benefit from supplying food to workers during the construction period. However, experience from the Lao PDR–China railway construction project suggests that domestic companies that are supposed to provide material and related goods for railway construction activities have not yet benefited from the project. Most materials, including steel and cement, are imported from China, because local materials do not meet the construction standards. Chinese companies also provide the catering services, because local companies are not capable of providing services that meet the exacting demands of the project. There is therefore an urgent need to improve the quality of construction materials and the capacity of local companies to meet the demands of large-scale construction projects.

4. Conclusion

In summary, Lao PDR has a holistic plan for land transport infrastructure development. This includes improving existing ASEAN highway sections in the country, constructing major connecting bridges, building the Lao–Chinese (Boten–Vientiane) railway, and initialising Savannkhet–Lao Bao railway and other planned railways that are currently at the feasibility stage. For the VHE, the most important connecting main roads to undergo upgrading are the AH12 or NR13 South and the AH12 or NR13 North, which connect the expressway to the southern and northern parts of the country. The ongoing construction of the expressway system from Vientiane Capital to Vangvieng – part of the route to

Chinese border – will connect Boten (on the Lao PDR–China border) with Namphao (on the Lao PDR–Viet Nam border) through the VHE.

It is clear that Lao PDR and its neighbours would benefit greatly from the construction of the VHE as a result of trade generated from the use of the road and spillover effects from connection to major cities, industrial estates, and tourist sites along or near the road. However, such benefits also depend on improving the soft infrastructure, or institutional arrangements. There is substantial progress in this regard, including revisions of several legislative and regulatory frameworks, institutional change, the piloting of single-stop inspection in the common control area at Lao Bao–Densavanh International checkpoint. However, these improvements and initiatives need to be further strengthened so that they are more closely aligned with the committed international, regional, and bilateral transport agreements, particularly the GMS Cross-Border Transport Facilitation Agreement. Without such soft infrastructure improvements to reduce the time and cost of custom clearance or quarantine, the benefits from the VHE and other planned expressways will be lost.

All transport infrastructure plans will be equally important and supportive to the planned VHE, but much will depend on whether Lao PDR can source enough financing for all the planned projects. In addition to the new road, many existing roads also need budgets for upgrading if the synergistic effect on the overall transport system is to be achieved. The transport infrastructure planned for 2016−2020 requires almost $10 billion, nearly four times more than the government could realistically mobilise (MPWT, 2015b). Much of the financing for these infrastructure projects is expected to come from multi- and bilateral development partner assistance. For example, the Asian Development Bank and the governments of China and Thailand funded the upgrading of Route 3 in northwestern Lao PDR, which connects China with Thailand through Luang Namtha and Bokeo provinces; and the Government of Japan funded the upgrading of Route 9 in southern Lao PDR, which connects Thailand and Viet Nam via Savannakhet Province.

The government's limited budget has been used mainly for road maintenance and to construct a few selected strategic roads or road sections. In the coming years, Lao PDR will face the challenge of increasing demands for maintenance of the existing road infrastructure, particularly the greater need for ongoing repairs to ensure the quality of the road network. Climate change will exacerbate these challenges because the network is susceptible to damage from increasingly severe natural disasters.

Reconstruction and repair of damaged roads will consume much of the limited budget for overall infrastructure development. Currently, the road maintenance fund covers only one-third of the budget needed. This poses a big challenge to Lao PDR and calls for prioritisation of the infrastructure projects and continued assistance from development partners. While it will be important to prioritise best practices in road maintenance, Lao PDR should also explore alternative means of financing the construction of new roads, such as public–private partnership (PPP) contract structures as a way of inviting private sector investment to the sector. So far, Lao PDR has only implemented PPPs in 16 energy projects (MPWT, 2014). Careful study and support are needed to expand the positive experience with the PPP model to the road sector.

Experience shows that the capacity of local industry to support major construction projects remains low. This prevents domestic companies from benefitting indirectly from such projects. Improving the quality of construction materials and the capacity of local companies to meet the demands of major construction projects is thus urgently needed.

References

Nishimura, N., F. Kimura, M. Ambashi, and S. Keola (2016), *Lao PDR at the Crossroads: Industrial Development Strategies 2016–2030,* Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA), http://www.eria.org/publications/lao-pdr-at-the-crossroads-industrial-development-strategies-2016-2030/ (accessed 18 February 2019).

Government of Lao PDR, Ministry of Public Works and Transport (MPWT) (2014), Ministry of Public Works and Transport Presents Business Case for National Road 13 Public–Private Partnership in Lao PDR, Vientiane: MPWT.

Government of Lao PDR, MPWT (2015a), 2030 Vision and the 2016–2025 Development Strategy of the Public Works and Transport Sector (draft), Vientiane: MPWT.

Government of Lao PDR, MPWT (2015b), Five Year Development Plan of the Public Works and Transport Sector for 2016–2020, Vientiane: MPWT.

Government of Lao PDR, Ministry of Planning and Investment (MPI) (2016), 2030 Vision and 10 Year Socio-Economic Development Strategy (2016–2025), Vientiane: MPI.

Rajvong, A. 2010, Social-Economic Impact of R3 Road on Thailand, Lao PDR, and Yunnan Province (PRC) with Focus on Lao PDR (Unpublished Master's thesis), Chulalongkorn University, Bangkok.

Chapter 5

Maximisation of Economic Benefits and Industrial Development Strategies through the Vientiane–Hanoi Expressway: The Case of Viet Nam

Vo Tri Thanh

1. Introduction

Since the start of Doi Moi (market-oriented economic reforms) in 1986, Viet Nam has embarked on comprehensive market-oriented institutional reforms, macroeconomic stabilisation, and proactive economic integration. In particular, proactive economic integration sought to enhance Viet Nam's access to much-needed foreign resources for its development, including from foreign markets, foreign investment, technology, and technical assistance. Over time, Viet Nam has gained more experience and adopted best practices in economic integration with the aim of facilitating the flow of goods, services, and people more broadly rather than merely complying with its obligations to phase out tariff and non-tariff barriers.

For decades, Viet Nam has attempted to enhance physical connectivity, particularly road links. The Socio-Economic Development Strategy, 2011–2020 emphasises infrastructure development, including roads, as one of the three major breakthroughs. The Government of Viet Nam in its Strategy for Transport Development up to 2020, with its vision toward 2030,[1] views road transport as essential for gathering and delivering passengers and cargo over short to medium distances. This emphasis also opened the way for Viet Nam's participation in international initiatives such as the Master Plan for ASEAN Connectivity (ASEAN Secretariat, 2010), and the Asia-Pacific Economic Cooperation Framework on Connectivity. In such frameworks, Viet Nam's road projects no longer serve only domestic needs, but incorporate the facilitation of cross-border links for smoother and less costly flows of goods, services, and people.

[1] Decision No. 355/QD-TTg dated 25 February 2013 by the Prime Minister approving amendment of the Strategy for Transport Development up to 2020, with its vision toward 2030. Hanoi.

The Vientiane–Hanoi Expressway (VHE) is an initiative to enhance road links between Hanoi in Viet Nam and Vientiane in Lao PDR. It will pass through several provinces in the northern and central regions of Viet Nam, thereby enhancing their connectivity with Hanoi. Along different segments of the expressway, options may include upgrading or new construction, each of which has different implications in terms of impact, finance, site clearance, and resettlement of affected people. It is therefore crucial to examine the socio-economic effects of the VHE to validate support for the initiative. This paper aims to (i) assess impacts of the VHE on the economy and industries of Viet Nam based on existing literature, data, and a survey; and (ii) illustrate the industrial development strategies of Viet Nam that may expedite the formation of the Hanoi−Vientiane−Bangkok industrial corridor with possible contributions from the VHE.

The paper is structured as follows. Section 2 describes the current development context; Section 3 discusses the potential impacts of the VHE on Viet Nam's economic development; and Section 4 makes some recommendations on steps Viet Nam should take to maximise the benefits from the VHE.

2. Current Development Context

2.1 Road development policy in Viet Nam

There is a clear decentralisation of investment in and management of the road system in Viet Nam. The central government manages the national roads system, the provincial government manages the provincial roads, the district administration is responsible for the inter-commune roads, and the commune administration oversees rural transport. Viet Nam has high density of national roads in the northern and southern delta regions. Many new national roads are being built in the northern mountainous area, the Central Highlands, and the Mekong River Delta. However, road quality is a concern. Limited and dispersed investment capital has prevented integrated development of the road network. In some regions, surveys indicate modest compatibility between bridges and roads, especially in the Mekong River Delta, with its interlacing system of canals and arroyos. Many national road routes have a loading capacity of up to 30 tonnes, but some bridges along these routes can only accommodate 10 tonnes, or even 7 tonnes, thus undermining capacity utilisation along the entire route. This incompatibility also presents a major barrier for attracting investment.

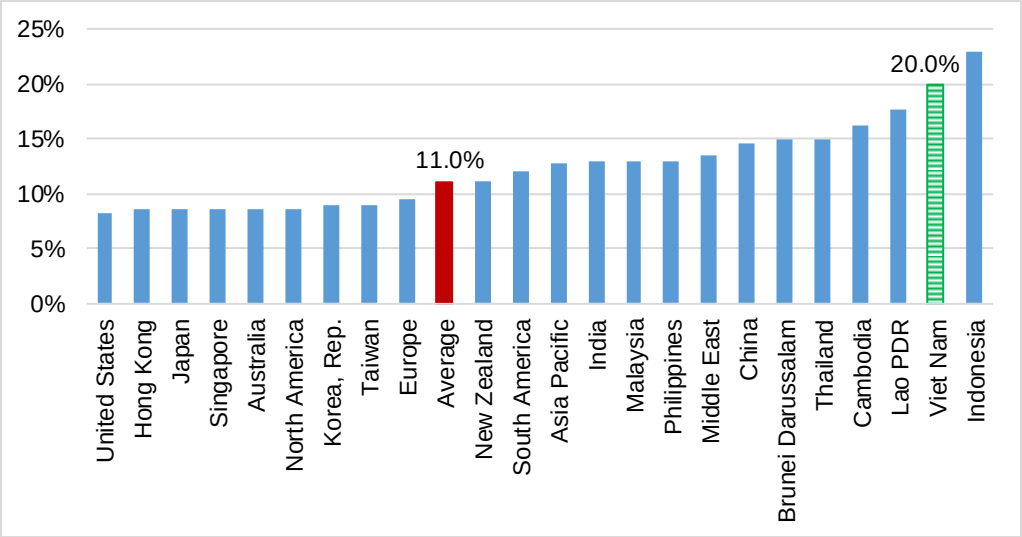
The provincial roads also assume a very important role by connecting national roads with important

areas in the provinces. Investment in provincial roads comes from local budgets. However, underdeveloped provinces have limited budgets and are normally located in remote regions such as the northern mountainous area, the central region, the Central Highlands, or the Mekong River Delta region. In these provinces, the investment demand to develop the transport system is huge and the investment cost per kilometre (km) of road is much higher than in other regions. (In the Mekong Delta region, for example, the land is often unconsolidated and has many canals, leading to higher construction costs.) As a result, despite higher levels of state support, the quality of these provinces' road systems is still far below that of roads in other delta regions.

Viet Nam has a total road length of about 319,206 km, including 13 segments of expressway with a total length of 746 km (0.2% of the total) and 105 sections of national highway with a total length of 22,660 km (7.1% of the total). National highways of grades I–III account for 43% of the total highways. On the main north–south route, a project to upgrade and expand National Highway No. 1 to four lanes from Hanoi to Can Tho Province has been completed. However, as this highway passes through many cities with different traffic conditions (e.g. urban and rural areas, different speed controls, and different secondary road links), it cannot meet the growing demand for transport.

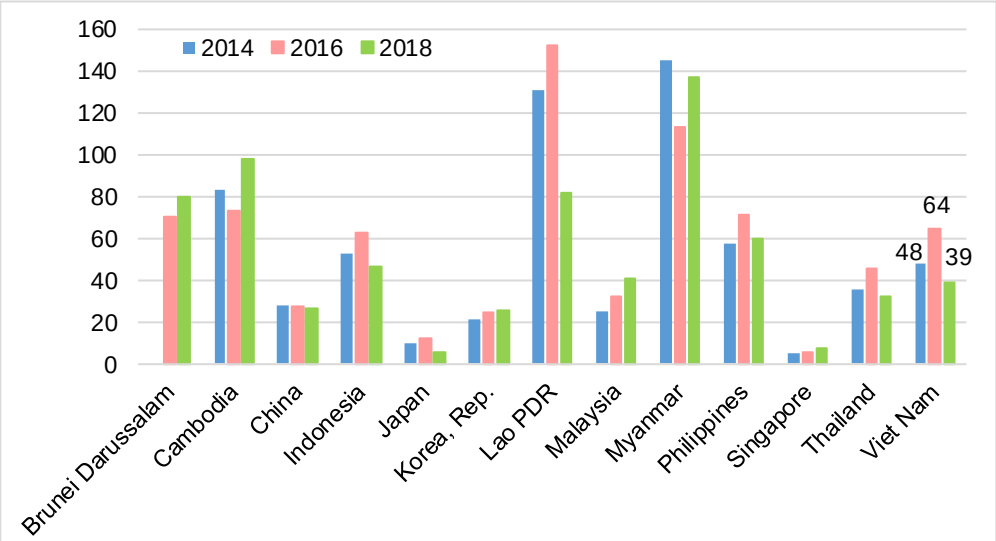
Underdevelopment of the road system is amongst the reasons for the country's high logistics costs. At 20% of gross domestic product (GDP), Viet Nam's logistics costs are almost twice the international average, making the country uncompetitive in this cost area (Nathan & Associates, 2018) (Figure 5.1). Viet Nam's logistics costs are a little higher than those of Lao PDR and significantly higher than Thailand's. In addition, Viet Nam's rank in the World Bank's Logistics Performance Index slid from 48th in 2014 and 2018 to 39th in 2016 (Figure 5.2). Amongst member countries of the Association of Southeast Asian Nations (ASEAN), Viet Nam outperforms Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, and the Philippines. Joint efforts by Lao PDR, Thailand, and Viet Nam to improve road links could therefore be mutually beneficial for enhancing logistical competitiveness.

Figure 5.1: Logistics Cost as a Percentage of Gross Domestic Product, 2018



Source: Armstrong & Associates (2018).

Figure 5.2: Logistics Performance Index Rankings

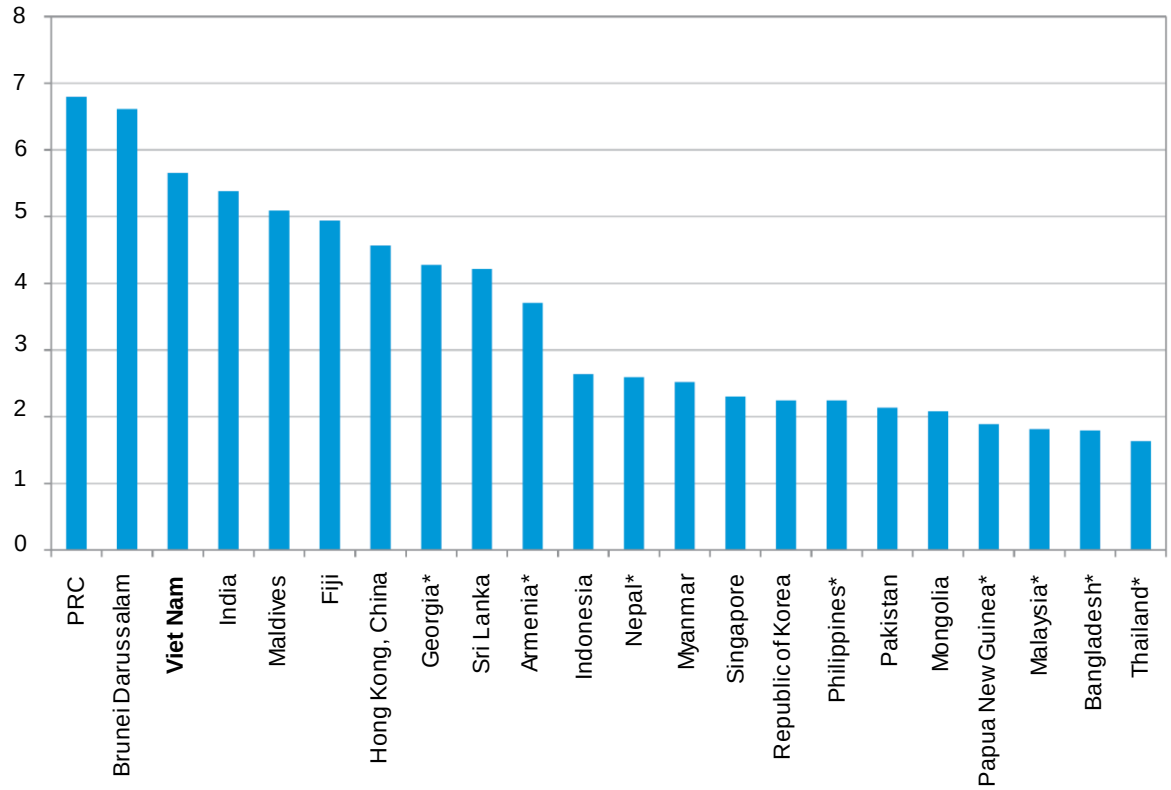


Source: World Bank.

Viet Nam's continued emphasis on infrastructure development, especially roads, is shown by the relatively high share of budget-funded investment in infrastructure (Figure 5.3). Roads accounted for 88% of public expenditure on transport during 2009–2012.

Figure 5.3: Budget+PPI Infrastructure Investment Rate, Various Years

(% of gross domestic product)



PPI = private participation in infrastructure, PRC = People's Republic of China.
Note: The asterisk denotes central government budget only.
Source: Asian Development Bank (2017).

However, the country suffers from a serious shortage of funds for road development and maintenance. In 2016, the Ministry of Transport projected that Viet Nam would need D1,015 trillion (about $48 billion) for transport development, of which road development projects would account for D651 trillion (Tram Anh, 2016). The capital of the Central Fund for Road Maintenance, which came into operation in 2013, does not meet the minimum requirement for practical road maintenance. In 2018, it could only provide 35% of the needed capital. To mobilise funds for road development, Viet Nam has had to rely in part on foreign borrowing, mostly by the government. As Table 5.1 shows, transport accounted for the largest share of foreign borrowing in both 2010–2015 and 2016–2017. This reflects the government's continued emphasis on road development despite the reduced access to official development assistance and concessional loans that accompanied Viet Nam's transition to middle-income status in 2008.

Table 5.1: Foreign Borrowing by Sector, 2010–2017

Sector	Total Foreign Capital	**Amount** ($ million)		**Share** (%)	
		Loans	Grants	2016−2017	2010−2015
Transport	3,124.67	3,093.46	31.21	35.89	35.68
Environment (water supply, drainage, climate change response, etc.), urban development	2,575.75	2,546.98	28.77	29.58	18.65
Energy and industry	1,127.36	1,127.36		12.95	17.14
Agriculture and rural development, poverty reduction	715.53	712.99	2.54	8.22	9.47
Health – social affairs	259.79	257.29	2.50	2.98	4.65
Education and training	297.88	297.88	0	3.42	3.35
Others (science and technology, institutional capacity building, etc.)	605.88	594.412	11.46	6.96	11.05
Total	8,706.85	8,630.36	76.49	100	**100**

Notes: Numbers may not sum precisely because of rounding. Percentages may not total 100% because of rounding. Figures for 2017 are estimates.
Source: Government of Viet Nam, Ministry of Planning and Investment.

Since 2011, acknowledging its reduced access to official development assistance and concessional loans, Viet Nam turned its attention to leveraging domestic private investment for road development projects. To this end, the government has gradually amended the legal framework to legitimise and facilitate public–private partnership in road development. By mid-2015, the Ministry of Transport had implemented 71 build–operate–transfer and build–transfer projects with a total investment of D202,6 trillion (Le et al., 2018). However, these projects have experienced a range of problems, including poor evaluation of project costs, excessively long payback periods, and restricted consumer choices as a result of the design of the toll collection booth. In August 2018, the Ministry of Finance asked the Hanoi People's Committee to postpone the settlement of costs for five build–transfer road projects by using publicly owned land.

2.2 International framework for connectivity enhancement

Viet Nam participates in several international frameworks for connectivity enhancement, notably the

Greater Mekong Subregion (GMS) Economic Cooperation Program, the Master Plan for ASEAN Connectivity (MPAC), and the Asia-Pacific Economic Cooperation (APEC) Framework on Connectivity.

In 1992, the six GMS countries,[2] with assistance from the Asian Development Bank (ADB) and building on their shared histories and cultures, launched the GMS Economic Cooperation Program. To realise its vision of a prosperous, integrated, and harmonious subregion, the GMS Program has adopted a three-pronged strategy (the three Cs): (i) increasing connectivity through sustainable development of physical infrastructure and the transformation of transport corridors into transnational economic corridors; (ii) improving competitiveness through efficient facilitation of cross-border movement of people and goods and the integration of markets, production processes, and value chains; and (iii) building a greater sense of community through projects and programmes that address shared social and environmental concerns (ADB, 2015).

MPAC serves to connect ASEAN through enhancing physical, institutional, and people-to-people connectivity. It plays a pivotal role in achieving a key goal of the ASEAN Vision 2020: '… transforming ASEAN into a stable, prosperous, and highly competitive region with equitable economic development, and reduced poverty and socio-economic disparities'. Within this framework, projects to enhance physical connectivity aim to ensure freer flows of goods, services, and people amongst ASEAN Member States, including Viet Nam. By design, physical connectivity under MPAC takes a project-driven approach. ASEAN leaders adopted MPAC in Hanoi in 2010. The overarching objective of MPAC is to 'promote economic growth, narrow development gaps, ASEAN integration and Community building process, enhance competitiveness of ASEAN, promote deeper social and cultural understanding as well as greater people mobility and connect its Member States within the region and with the rest of the world'. After the establishment of ASEAN Community in 2015, ASEAN Member States endorsed MPAC 2025 (ASEAN Secretariat, 2015), with a vision 'to achieve a seamlessly and comprehensively connected and integrated ASEAN that will promote competitiveness, inclusiveness, and a greater sense of Community'. The successful implementation of MPAC 2025 will contribute immensely to the realisation of the ASEAN Vision 2025.

Meanwhile, since its inception, APEC has worked to promote Asia-Pacific connectivity. Since 2009, APEC has advanced its agenda to improve supply-chain connectivity (e.g. for the APEC-wide target of

[2] The GMS countries comprise Cambodia, China (specifically Yunnan Province and Guangxi Zhuang Autonomous Region), Lao PDR, Myanmar, Thailand, and Viet Nam.

a 10% improvement in supply-chain performance by 2015, in terms of reduction of time, cost, and uncertainty of moving goods and services through the Asia-Pacific region, taking into consideration individual economies' circumstances). This is part of APEC's comprehensive approach to working 'at the border', 'behind the border', and 'across the border'. As part of the work to achieve the Bogor Goals by 2020 and the 2010 Yokohama Vision of 'Bogor and Beyond', APEC leaders declared again in 2013 the aspiration to reach a seamlessly and comprehensively connected and integrated Asia-Pacific by realising (i) 'physical connectivity' that improves supply-chain performance and connects and integrates logistics, transport, energy, and telecommunication infrastructure in the APEC region; (ii) 'institutional connectivity' that advances regulatory and procedural cooperation and coherence amongst our economies; and (iii) 'people-to-people connectivity' that enhances interaction, mobility, and joint endeavours. In 2014, APEC leaders endorsed the APEC Connectivity Blueprint, 2015–2025. The blueprint contains existing connectivity-related initiatives; encourages reviving those initiatives that require further progress; and proposes future initiatives for more efficient flows of goods, services, capital, and people to drive APEC progress. It is broad in scope and adaptable to the ever-changing conditions in the Asia-Pacific.

More recently, the Belt and Road Initiative (BRI), proposed and advocated by China, has attracted immense attention due to the sizeable implications (beyond economic opportunities) that it may produce internationally and regionally. As Le (2018) observes, 'Although China's official propaganda describes the BRI as a broad, comprehensive initiative that includes policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people connections, it's China's proposal to create massive networks of infrastructure across Asia, Africa and Europe, including roads, railways, harbours, airports, pipelines, and fibre optic, that is most appealing to regional countries, including Viet Nam'. However, apart from scattered welcoming remarks on the BRI, Viet Nam has remained sceptical when discussing further details, including potential projects to be financed by BRI loans.

3. Economic Performance of Related Provinces

The provinces along the VHE maintained high GDP growth rates during 2016–2017 (Table 5.2). Hanoi grew by 8.2% in 2016 and almost 8.5% in 2017. Other provinces largely recorded single-digit growth

in the same period, except Ha Tinh Province, which experienced negative growth in 2016. Regional GDP growth in these provinces generally outpaced overall GDP growth. However, in terms of scale, Hanoi dominates, with 15.8%–15.9% of overall GDP, while Ninh Binh, Thanh Hoa, and Nghe An provinces account for only 1.5%–2.6%.

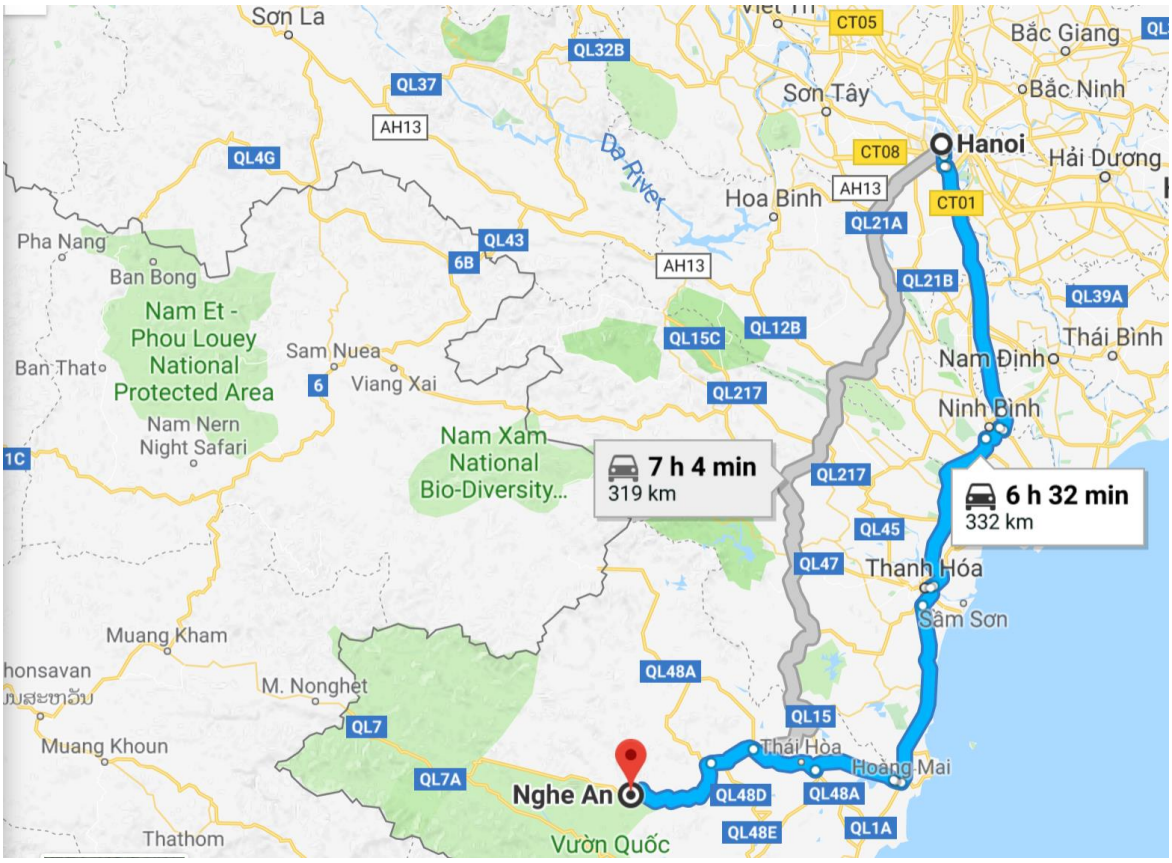
Table 5.2: Gross Domestic Product Growth of Selected Provinces

Province	GRDP (D billion, comparable prices)		Growth (%)	
	2016	2017	2016	2017
Hanoi	478,964	519,568	8.20	8.48
Ninh Binh	45,150	48,739	10.12	7.95
Thanh Hoa	79,213	85,756	9.05	8.26
Nghe An	70,036	75,814	7.50	8.25
Ha Tinh*	n.a.	n.a.	–15.31	10.51
Viet Nam	**3,054,470**	**3,262,548**	**6.21**	**6.81**

GRDP = gross regional domestic product, D = Vietnamese dong.
* Data on GRDP of Ha Tinh is not publicly available.
Source: Government of Viet Nam, General Statistics Office.

Currently, there are two main options for travelling by road from Hanoi to Nghe An: the Ho Chi Minh road, which takes about 7 hours, and National Highway No. 1, which is about a 6-hour drive. National Highway No. 1 has undergone upgrades and expansions along different sections (Figure 5.4). For instance, the stretch from Phap Van to Cau Gie has long been referred to as an expressway, although it does not meet expressway standards. As one of the major roads with the heaviest traffic in the country's north, by 2013, some parts of this section had deteriorated due to excessive traffic after 12 years of use. In 2014, the road was upgraded to a standard expressway with four lanes and a maximum speed of 100 km/hour. The second phase following the upgrading began in 2018. Upgrades to the Cau Gie–Ninh Binh section were completed in 2018. The Ministry of Transport proposed investment under the public–private partnership modality for the Ninh Binh–Thanh Hoa section of National Highway No. 1, which is to be upgraded to an expressway.

Figure 5.4: Road Connections from Hanoi to Nghe An



Source: Google Maps, modified by the author.

Roads are still the main mode of transport from Hanoi to Nghe An. Rail and air could be alternatives for the movement of passengers and goods between these two cities. However, flights are only available between Hanoi and Nghe An Province, and there are no operations in the provinces in between. Meanwhile, the railway system in general suffers from underdevelopment, poor governance, inadequate innovation, and a lack competitiveness compared to road.

The provinces along the VHE experienced rapid expansion of trade in 2017. Only Hanoi saw single-digit export growth in 2017, but its exports made up more than 5.4% of Viet Nam's total exports. Meanwhile, Hanoi accounted for more than 13.5% of Viet Nam's imports, with import growth of 13.2% in 2017. Trade expanded much rapidly in provinces other than Hanoi (Table 5.2), although each of these provinces only accounted for up to 0.8% of the country's total exports or imports. Whether these provinces can sustain trade growth in the coming years remains to be seen.

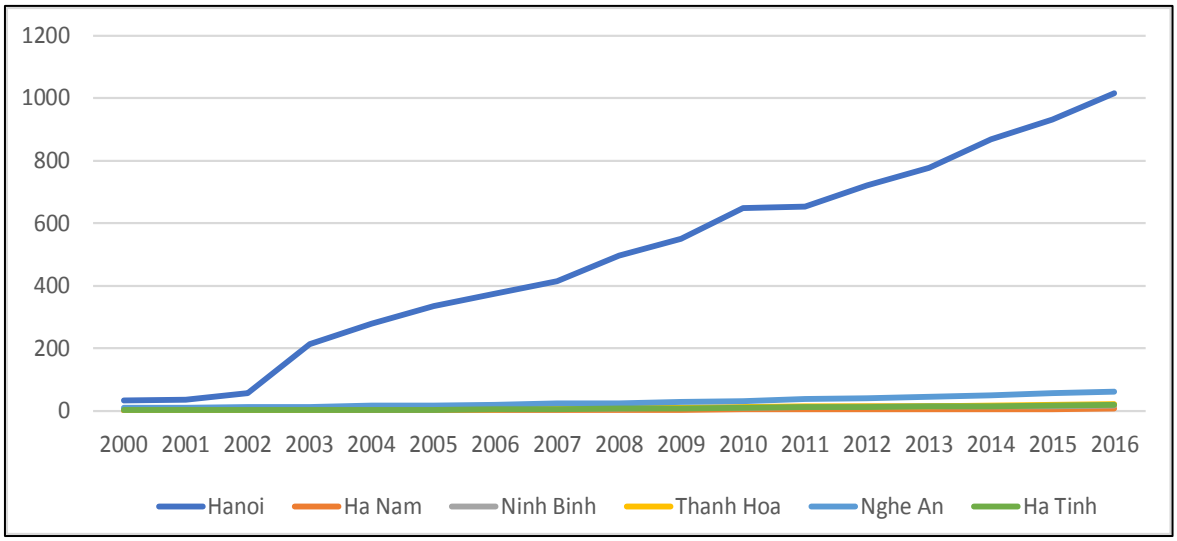
Table 5.3: Trade Figures of Selected Provinces

Province	Exports ($ million) 2016	2017	Growth (%)	Imports (% million) 2016	2017	Growth (%)
Hanoi	10,681	11,706	9.6	25,459	28,825	13.2
Ha Nam	1,225	1,718	40.2	1,281	1,558	21.6
Ninh Binh	798	1,006	26.1	896	1,249	39.4
Thanh Hoa	1,493	1,750	17.2	948	1,338	41.1
Nghe An	538	692	28.6	580	766	32.1
Overall	**176,617**	**215,119**	**21.8**	**174,739**	**213,007**	**21.9**

Source: Government of Viet Nam, General Department of Customs.

Figure 5.5 shows the increase in passenger transport in VHE provinces during 2000–2016. Hanoi was the only one to record a notable and continuous increase in passenger transport volumes. However, the average annual growth of passenger transport in Hanoi dropped from 49.7% in 2001–2006 to 10.5% in 2007–2016. Consequently, the growth rate of passenger transport in Hanoi was the lowest amongst the six provinces in 2007–2016.

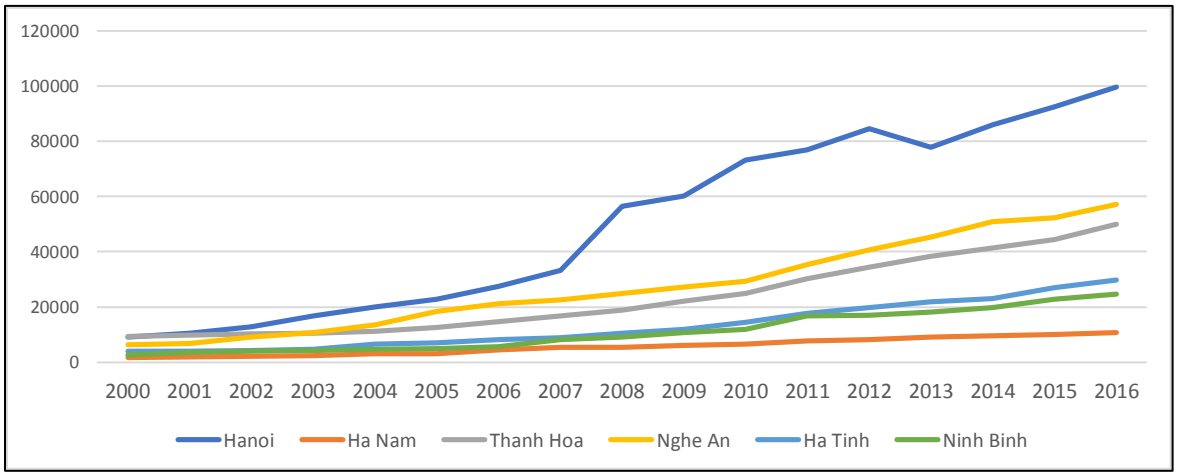
Figure 5.5: Transport of Passengers in Selected Provinces, 2000–2016 (million)



Source: Government of Viet Nam, General Statistics Office.

Similarly, Figure 5.6 depicts the expansion of freight transport in VHE provinces during 2000–2016. Again, Hanoi had the highest volume of freight transport. Hanoi had the second-highest average annual growth rate in 2001–2006 (20.2%, after Nghe An, with 22.3%) and in 2007–2016 (13.7%, after Ha Tinh, with 13.9%). Unlike passenger transport, the upward trends in freight transport appear to be more similar across VHE provinces.

Figure 5.6: Freight Transport in Selected Provinces, 2000–2016 (thousand tonnes)



Source: Government of Viet Nam, General Statistics Office.

With the exception of Nghe An Province, where tourism revenues increased by an average of only 6.9% per annum in 2010−2015, the provinces along the VHE enjoyed rapid growth in revenues from tourism services (Table 5.4). Tourism revenue growth in Hanoi was similar to the national average but accounted for more than one-quarter of total tourism revenues. The challenge, therefore, is to identify new drivers that can help increase the spillover effects of tourism from Hanoi to other provinces along existing roads, such as Ha Nam, Ninh Binh, Thanh Hoa, and Nghe An.

Table 5.4: Revenues from Tourism Services (D billion)

Province	2010	2012	2013	2014	2015	Average Growth 2010–2015 (% p.a)
Hanoi	4,006	3,007	6,764	7,483	7,832	14.4
Ha Nam	8	10	12	14	15	15.0
Ninh Binh	4	6	14	19	9	14.6
Thanh Hoa	22	43	50	60	73	27.7
Nghe An	38	52	48	49	53	6.9
Overall	**15,539**	**18,853**	**24,821**	**27,799**	**30,444**	**14.4**

Source: Government of Viet Nam, General Statistics Office.

The VHE provinces have attracted foreign direct investment (FDI) to varying degrees (Table 5.5). By the end of 2017, Hanoi had the largest volume of registered capital and number of registered projects. Thanh Hoa and Ha Tinh provinces had quite a large volume of registered capital but a relatively small number of larger FDI projects.

Table 5.5: Operative Foreign Direct Investment Projects in Selected Provinces, end of 2017

Province	Number of Projects	Total Registered Capital ($ million)
Hanoi	4,500	27,638.0
Ha Nam	215	2,437.6
Ninh Binh	59	1,266.3
Thanh Hoa	102	13,819.0
Nghe An	79	1,820.9
Ha Tinh	62	11,613.2
Total	**24,803**	**319,613.1**

Source: Government of Viet Nam, General Statistics Office.

Sustained high rates of economic growth propelled a continuous reduction in the incidence of poverty in the provinces along the VHE during 2010–2016 (Table 5.6). By 2016, Nghe An was the only province with a household poverty incidence of more than 10%. At the other end of the spectrum, Hanoi's poverty incidence had dropped to 1.3% in 2016 from 5.3% in 2010. In line with this analysis, if additional development mechanisms (such as the VHE and related measures such as industrial cooperation) can link these provinces, it is likely that Ha Nam, Ninh Binh, Thanh Hoa, and Nghe An would see poverty incidences approaching the low rate of Ha Noi.

Table 5.6: Poverty Incidence, 2010–2016 (%)

Item	2010	2012	2013	2014	2015	2016
National	**14.2**	**11.1**	**9.8**	**8.4**	**7**	**5.8**
Hanoi	5.3	3.6	2.9	2.3	1.8	1.3
Ha Nam	12	9.1	7.9	6.6	5.5	4.4
Ninh Binh	12.2	9.3	8.1	6.6	5.5	4.3
Thanh Hoa	25.4	19.9	17.5	14.5	12	9.6
Nghe An	24.8	19.8	17.4	14.4	12.3	10.4

Source: Government of Viet Nam, General Statistics Office.

4. Potential Impacts of the Vientiane–Hanoi Expressway on Viet Nam's Development

Both theory and experience suggest that the VHE could improve capacity to facilitate the flow of goods and services across the five provinces it traverses (Hanoi, Ha Nam, Ninh Binh, Thanh Hoa, and Nghe An). This impact can be realised through widening of roads and/or shortening of travel times. Similar highways illustrate the potential improvements. For example, the Hanoi–Hai Phong highway (NH5) has shortened travel time from 4 hours to less than 2 hours, and it takes only 3 hours to drive between Hanoi and Lao Cai on the Hanoi–Lao Cai expressway compared to 7 hours before the expressway was constructed.

The shortened travel time makes various trade transactions viable that were not previously economically feasible, such as direct trade activities by firms in Nghe An, Thanh Hoa, Ninh Binh, and Ha Nam. Experience shows that the improved transport of passengers and freight in these provinces could partly be attributed to the upgrading of roads in these provinces, including the concerned segments of the national highway. Based on such experiences, the VHE could further boost transport of passengers and freight in those provinces

Experience from the NH5 shows that traffic volumes increased faster than planners expected (Tran and Nguyen, 2013). The economic growth of the surrounding area also far surpassed the expectations of the planners. Consequently, the amount of traffic rose so fast that another wider and more sophisticated highway became necessary. The construction of the new highway, running parallel to the NH5, began in early 2008 and was completed in 2015 (despite originally scheduled completion in 2013). The improved NH5 therefore became an important example of how to create and exploit new opportunities for regional growth and development.

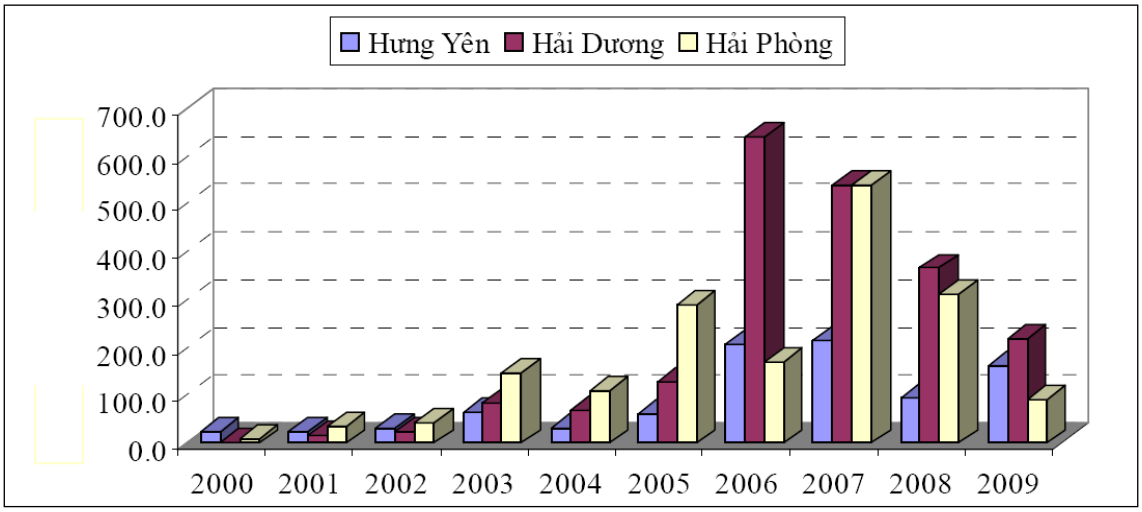
The upgrading of the NH5 led to a major drop in travel time between Hanoi and Haiphong, from 5 hours to 2 hours. Average travel speed increased from 24–30 km/hour to 50–60 km/hour (Japan International Cooperation Agency, 2007, cited in Tran and Nguyen, 2013). Thus, construction of the NH5 played a large part in the development of the region between Hanoi and Haiphong. In 2003, the Japan Bank for International Cooperation conducted an assessment of the project's impact on the development of the surrounding area.[3] The assessment found that the project had generated positive advances in the region's economic and social activities by stimulating FDI inflows into Hung Yen, Hai Duong, and Hai Phong (Figure 5.7). The volume of goods transported through Hai Phong port jumped sharply, from more than 4.5 million tonnes in 1995 to 12.7 million tonnes in 2003, and 32.9 million tonnes in 2009. Accordingly, the NH5 helped strengthen Viet Nam's capacity to take advantage of opportunities triggered by international economic integration.

FDI in the provinces along the VHE may also increase. Experience in Viet Nam shows that improved road connections contribute to higher FDI inflows, and this in turn induces industrialisation in the provinces involved. In addition to reforms at the national level, the NH5 improvement project enhanced the business environment in the surrounding provinces of Hai Phong, Hung Yen, and Hai

[3] The committee was chaired by Tho Van Tran.

Duong. The number of local enterprises in Hai Phong rose from 1,089 in 2000 to 2,625 in 2004, and then to 4,913 in 2008. The corresponding figures were 224,552, and 1,355 in Hung Yen; and 507, 1,123, and 2,741 in Hai Duong. Furthermore, the reduced costs of doing business helped improve company performance, especially net turnover.

Figure 5.7: Foreign Direct Investment in the Provinces Surrounding the Hanoi–Hai Phong Highway
($ million)



Source: Government of Viet Nam, General Statistics Office.

More broadly, the VHE can help the provinces of Ha Nam, Ninh Binh, Thanh Hoa, and Nghe An leverage connection to the existing expressway (i.e. the Hanoi–Hai Phong–Quang Ninh triangle). This in turn will better facilitate the flows of goods from these provinces to the major provinces and seaports in the northern economic triangle. It is noteworthy that Hai Phong port alone accounted for an estimated 92 million tonnes of merchandise flows in 2017 (of a country total of 280 million tonnes). Meanwhile, spare capacity still exists at the new port, Lach Huyen, in Hai Phong. This shows that the ports in Hai Phong could readily accommodate the increase in flows of goods from along the VHE to Hanoi and on to Hai Phong (Figure 5.8).

Local officials interviewed for their perspectives on the VHE were optimistic about the prospects for upgrading the VHE. When asked about impact projections on attracting FDI, they could not offer a rough figure. However, they appreciated the VHE's importance in enhancing connectivity of their provinces to Hanoi, the growth pole. The interviewees also indicated the good timing for the VHE, given the government has deepened efforts to reform the business environment and strengthen

competitiveness under the series of Resolution No. 19,[4] including measures to reduce costs of doing business and logistics. In particular, Resolution No.19, issued in 2018, requires the People's Committee in each province and city to propose and enact their own action plan to implement Resolution No. 19. In this context, the enhanced connectivity provided by the VHE would further attract investors to the provinces along the expressway.

Figure 5.8: Road Connectivity to Major Seaport in Hai Phong

km = kilometre.
Source: Quang Binh Import & Export Joint Stock Company (2018).

Improvements to roads and related infrastructure induce more rapid economic growth. Such a positive impact of the VHE should be expected, similar to the beneficial impacts of connectivity enhancement in other geographical regions in ASEAN under MPAC. Geographical simulation by the Economic Research Institute for ASEAN and East Asia shows that the first version of MPAC could increase economic output by at least 100% in 254 regions, with a maximum regional increase of 534%

[4] Since 2014, the government of Viet Nam issued Resolution No. 19 each year, with updated targets and practical policy measures to improve various aspects of the business environment, such as payment of taxes, access to electricity, specialized inspection, and logistics performance.

(ERIA, 2010) (Table 5.7). Viet Nam ranks second in terms of economic benefits, showing that the added initiative of enhancing road connectivity can be critical. In turn, poverty reduction outcomes can be leveraged, and these impacts could be magnified given Viet Nam's impressive record of poverty reduction largely due to improved road connections to disadvantaged regions.

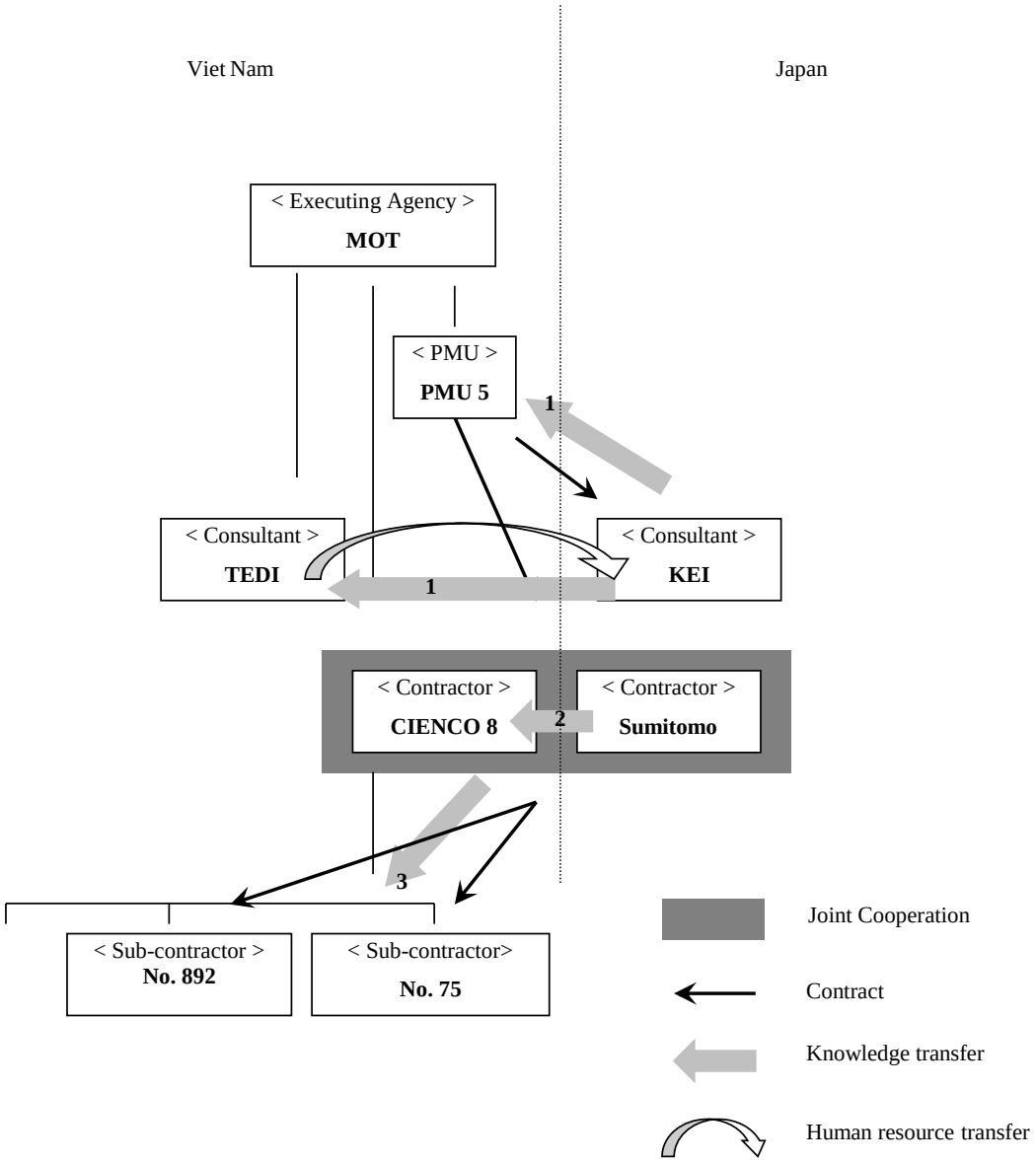
Table 5.7: Geographical Simulation of Impacts of the Masterplan for ASEAN Connectivity

Ranking by Region			Ranking by Country	
Region	**Country**	**Economic Effects**	**Country**	**Economic Effects**
Kota Lhokseumawe	Indonesia	533.7%	Myanmar	145.8%
Asahan	Indonesia	485.8%	Viet Nam	114.6%
Mamuju Utara	Indonesia	480.8%	Lao PDR	99.3%
Kota Pematang Siantar	Indonesia	463.4%	Thailand	98.6%
Rokanhilir	Indonesia	432.8%	Cambodia	97.9%
Indragiri Hilir	Indonesia	419.2%	Indonesia	85.0%
Kota Binjai	Indonesia	411.4%	Philippines	73.4%
Kota Kediri	Indonesia	410.3%	Malaysia	64.4%
Kota Tanjungbalai	Indonesia	408.1%	India	45.6%
Soc Trang	Viet Nam	404.4%	Singapore	29.2%
Number of regions with:	100% or more	254	China	25.4%
	50%–100%	239	Bangladesh	23.0%
	0%–50%	446	Hong Kong	8.2%

ASEAN = Association of Southeast Asian Nations.
Source: Economic Research Institute for ASEAN and East Asia (2010).

It should be noted that during the implementation of the project, knowledge transfers to Vietnamese stakeholders can occur through various channels. They can be channelled from foreign partners to local authorities in Viet Nam. In particular, experiences of planning, designing, and implementing projects can be shared with local authorities in Viet Nam. They may also take place from foreign contractors to local contractors through joint ventures or joint operations, or from contractors to subcontractors. Tran and Nguyen (2013) provided a detailed discussion on this aspect of the NH5 project (Figure 5.9).

Figure 5.9: Knowledge Transfers in the Hanoi–Hai Phong Highway



Source: Tran and Nguyen (2013).

Nevertheless, the impacts may be affected by road safety considerations. Traffic accidents have increased rapidly after the completion of various highways in Viet Nam. For instance, 2 years after the NH5 opened, the number of recorded accidents doubled. The main reason cited was the high speed of traffic. The concern is that aggressive speed control, which is often cited as one of the main underlying reasons for logistical underperformance, could reduce the potential benefits from the VHE. However, officials interviewed in some concerned localities (Nghe An and Thanh Hoa) expressed doubt that speed control to prevent accidents would reduce the project's benefits.

As a final consideration, the VHE may adversely affect Viet Nam's debt position. It should be noted that Viet Nam's gross investment dropped from 38.2% in 2008 (upon attaining middle-income status) to 33.5% in 2018. In particular, despite sluggish expansion, development investment from the state budget accounted for 22% of gross investment and 7.2% of GDP during 2010−2016 on average. Viet Nam's savings rate fluctuated from a low of 23.5% of GDP in 2008 to a high of 30.0% of GDP in 2012, before contracting to 25.0 % of GDP in 2016. Gross investment, including public investment expanded significantly widening the gap with savings. In the absence of a long-term strategy for public investment, including foreign borrowings, this trend could increase the risk of domestic economic instability. Meanwhile, the room for external borrowing is decreasing as the National Assembly attempts to impose discipline by restructuring public debt and external loans.

5. Policy Recommendations

Building a new road is a necessary but not sufficient condition for rapid and sustainable socio-economic development in the provinces of Viet Nam. Effective implementation of the international economic integration process remains a national priority. In 2018, Viet Nam fulfilled many international economic integration commitments, and from January 2019, it began to implement the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, while preparing for the ratification of the European Union–Viet Nam Free Trade Agreement. Accelerating the negotiation of important free trade agreements, such as the Regional Comprehensive Economic Partnership, can help leverage development opportunities for the country. However, Viet Nam must also enhance its domestic capacity to utilise the economic opportunities arising from economic integration. Enhancing road links across the different provinces in the country is important in this regard, particularly for disadvantaged provinces, where road initiatives can help foster the economic inclusion of businesses and social groups.

The following recommendations can be made in relation to the VHE. First, careful prefeasibility studies on the impacts of the expressway should be conducted for each province involved. Such studies should dedicate enough resources to identifying the economic opportunities and the social and environmental impacts on the concerned provinces. It should be noted that past figures for projects in Viet Nam should not be relied upon for estimating the investment outlay, because in 2018 the

country was still seeking to identify a standard costing for road projects.

Second, different funding and project scope scenarios should be carefully considered. One option, albeit a capital-intensive one, is to expand and upgrade the road to four lanes in all sections. Alternatively, selected sections could be designed with only two lanes in the first phase, with extension considered later.

Third, Viet Nam should explore the fiscal space to finance certain components of the project. While public debt as a percentage of GDP decreased in 2016−2018, the country still faces tight budget constraints given the enormous demand for public investment (including, for example, a high-speed train). The public–private partnership model, with the involvement of Vietnamese contractors, should be considered in detail.

Fourth, Viet Nam should consider designing a network of secondary road links to help connect the local districts in each province with the VHE. The concerned provinces and localities along the VHE can learn from the experiences of others located along major road projects such as the Hanoi–Hai Phong and Hanoi–Lao Cai expressways.

Fifth, Viet Nam should coordinate with other involved countries (especially Lao PDR and Thailand) to harmonise transport-related policies along the entire length of the regional road initiative. This will ensure maximum benefits to each participating country when the road is completed.

References

Armstrong & Associates (2018), Logistical Costs as Percentage of GDP. https://www.3plogistics.com/3pl-market-info-resources/3pl-market-information/global-3pl-market-size-estimates/ (accessed 20 November 2018).

ASEAN Secretariat (2015), Master Plan on ASEAN Connectivity 2025, https://asean.org/wp-content/uploads/2016/09/Master-Plan-on-ASEAN-Connectivity-20251.pdf (accessed 19 February 2019).

Asian Development Bank (ADB) (2015), Greater Mekong Subregion Economic Cooperation Program: Overview. Manila: ADB.https://www.adb.org/publications/greater-mekong-subregion-economic-cooperation-program-overview (accessed 19 February 2019).

ADB (2017), *Meeting Asia's Infrastructure Needs.* Manila: ADB. https://www.adb.org/publications/asia-infrastructure-needs (accessed 19 February 2019).

Economic Research Institute for ASEAN and East Asia (ERIA) (2010), *The Comprehensive Asia Development Plan*. Jakarta: ERIA. http://www.eria.org/publications/the-comprehensive-asia-development-plan/

General Statistics Office (n.d.) Home page. www.gso.gov.vn (accessed 16 October 2018).

Japan International Cooperation Agency (JICA) (2007), 'Evaluation Highlights on ODA Loan Projects 2007: National Highway No.5 Improvement Project (1)-(3), Viet Nam', https://www.jica.go.jp/english/our_work/evaluation/oda_loan/post/2008/pdf/e_project29_full.pdf (accessed 19 February 2019).

Le, H. (2018), 'The Belt and Road Initiative in Vietnam: Challenges and Prospects, Perspective', *ISEAS Yusof Ishak Institute,* 18, pp.1–7.https://www.iseas.edu.sg/images/pdf/ISEAS_Perspective_2018_18@50.pdf (accessed 16 February 2019).

Le, H., M. Ta, T. Pham, B. Tran, T. Dinh, T. Do, M. Le, X. Dao, and H. Le (2018), 'Risks of Public Administration in PPP Projects in Roads: Identification and Policy Solutions' [Rủi ro trong quản lý nhà nước đối với đầu tư theo hình thức công tư (PPP) lĩnh vực giao thông đường bộ: Nhận diện và giải pháp chính sách], ministerial-level research project (in Vietnamese).

Quang Binh Import & Export Joint Stock Company (2018), 'ICD Quang Binh–Dinh Vu: Finalization and Readiness for Operation since December' [ICD Quang Binh Dinh Vu gap rut hoan thien va san sang di vao hoat dong tu thang 12]. http://quangbinhjsc.com.vn/news/223-icd-quang-binh-dinh-vu-gap-rut-hoan-thien-va-san-sang-di-vao-hoat-dong-tu-thang-12 (accessed 21 December 2018).

Tram Anh (2016), 'Viet Nam Would Need USD 40 Billion for Transport Infrastructure Investment in the Next 5 Years [Cần 48 tỷ USD đầu tư hạ tầng giao thông trong 5 năm tới]. http://baodauthau.vn/dau-tu/can-48-ty-usd-dau-tu-ha-tang-giao-thong-trong-5-nam-toi-16640.html (accessed 20 November 2018).

Tran, V.T. and A.D. Nguyen (2013), 'ODA and Economic Development in Vietnam: An Assessment of the Transfer of Intangible Resources', in M. Nissanke and F. Shimomura (eds), *Aid as Handmaiden for the Development of Institutions: A New Comparative Perspective*. Palgrave MacMillan, pp. 124–160.

World Bank (2017), *Logistics Performance Index*. Washington, DC: World Bank. https://lpi.worldbank.org/ (accessed 20 June 2018).

Chapter 6

Maximisation of Economic Benefits and Industrial Development Strategies through the Vientiane–Hanoi Expressway: The Case of Thailand

Narong Pomlaktong

1. Introduction

Connectivity with industrial clusters is becoming more important for global value chains. At the manufacturing or firm level, the aim is to connect low-wage industrial regions with potential new markets. At the government level, the incentive is to boost economic growth and create wealth. Ultimately, the improvement in connectivity, especially in terms of roads and other logistics infrastructure, will benefit people in the surrounding areas (Isono, 2011).

In terms of connectivity, the railway project linking Vientiane to Vung Ang Economic Zones in Ha Tinh Province, Viet Nam, is expected to enable the Lao People's Democratic Republic (Lao PDR) to be more active in facilitating the transit of goods to and from Lao PDR.[1] In addition, road transport from Thailand to Viet Nam via the Third Mekong River Crossing Bridge (Nakhon Phanom–Khammouane) is central for the East–West Economic Corridor. The development project of the Vientiane–Hanoi Expressway (VHE) is expected to increase trade flows between Thailand, Lao PDR, and Viet Nam, and to result in more options for trans-shipment from Thailand to Viet Nam and China (Figure 6.1). This expressway project is also likely to help Lao PDR to become a regional freight hub, of which neighbouring countries will take full advantage.

[1] Lao PDR and Viet Nam signed an agreement on 14 September 2015 to build a railway to connect Vientiane and Vung Ang, and a highway to connect the two capitals. This railway infrastructure project is part of the strategic agreement on transport co-operation for 2016–2025, with a vision towards 2030. It is reported that Viet Nam will also create favourable conditions for Lao PDR to use Viet Nam's ports, especially Vung Ang Port (VietNamNet Online Newspaper, 2017).

Figure 6.1: Vientianei–Hanoi Expressway Development Project

km = kilometre.
Source: Google Maps, modified by the author.

2. New Route Choice to Increase Thailand–Lao PDR–Viet Nam Trade Flow

Isono (2011) notes that having additional routes is considered a solution for tightening connectivity as well as narrowing the development gap between countries and regions. For firms, it is beneficial to have several alternative routes because they can avoid natural disasters such as floods at specific points or congestion caused by accidents. For people, alternative routes allow them to participate in the expanding production network in the Mekong region.

As shown in Figure 6.2, the 5th Mekong River Crossing Bridge Project – from Muang District, Bueng Kan Province in Thailand to Pak San District, Bolikhamsai Province in the Lao PDR – is a highway network development aimed at making connections with Thailand, the Lao PDR, and Viet Nam under the Greater Mekong Subregion (GMS) Economic Cooperation Programme. It also consolidates the development strategy of competition competency in the upper northeastern region of Thailand in terms of economy, trade, and foreign investment.

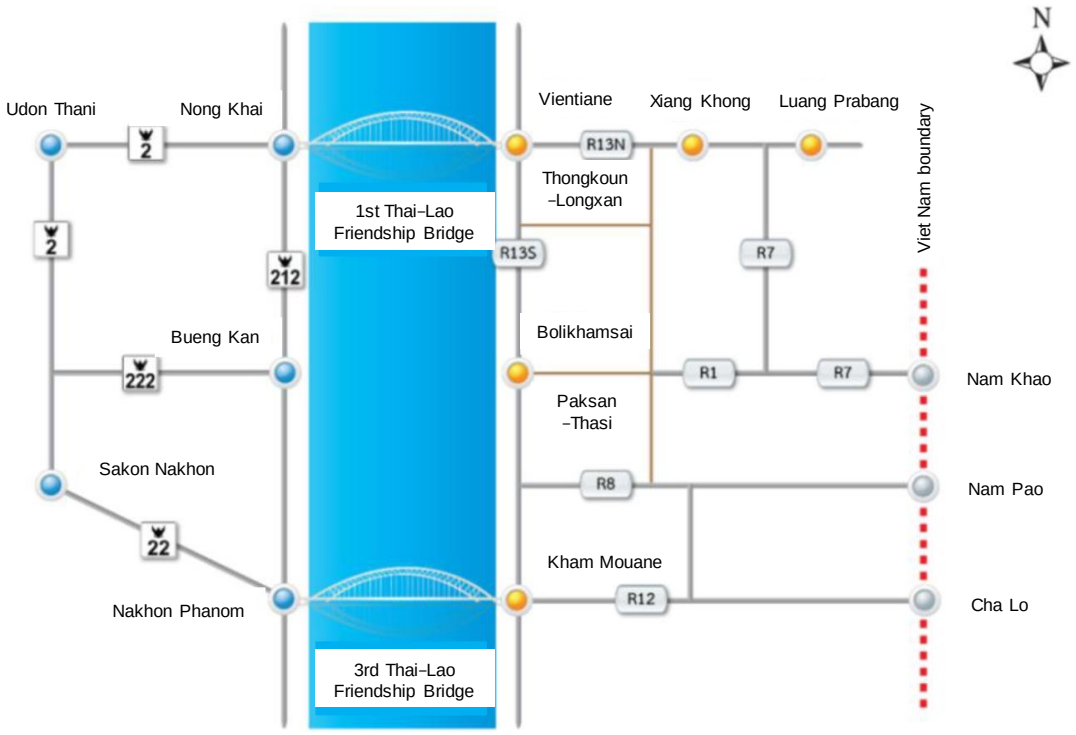
The Department of Highways (2014) focuses on three strategic areas which have a direct impact on project progress: (i) the area of the First Mekong Friendship Bridge (Nong Khai–Vientiane), (ii) the Third Mekong Friendship Bridge Area (Nakhon Panom–Khammouane), and (iii) the area near the tariff office at the Bueng Kan–Bolikhamsai border crossing.

Figure 6.2: Location of the 5th Mekong River Crossing Bridge Project

Source: Department of Highways (2014).

The study applied the structure of Thailand's national transport model (NAM) and used NAM's information to analyse and forecast transport and travel demands in six study areas in five provinces of Thailand (Nong Khai, Bueng Kan, Nakhon Phanom, Sakon Nakhon, and Udon Thani) and four districts in the Lao PDR (Vientiane, Bolikhamsai, Chiang Kwang, and Khammouane), as shown in Figure 6.3.

Figure 6.3: Thailand–Lao PDR–Viet Nam Road Network



Lao PDR = Lao People's Democratic Republic.
Source: Department of Highways (2014).

According to the Department of Highways (2014), the 5th Mekong Bridge is projected to attract a shift of 12.47% of travel and product transportation from the First Mekong Bridge (Nong Khai–Vientiane) and 18.2% from the Third Mekong Bridge (Nakhon Phanom–Khammouane). The 25-year forecast estimates that about 2,071,800 people per year (5,676 persons per day) and 313,694 cars per year (1,722 cars per day) will cross the 5th Mekong Bridge in 2039. The 5th Mekong River Crossing Bridge Project would result in large economic benefits in terms of greater net income from border trading, as well as indirect benefits such as cost saving from vehicles used and travel time, as shown in Table 6.1.

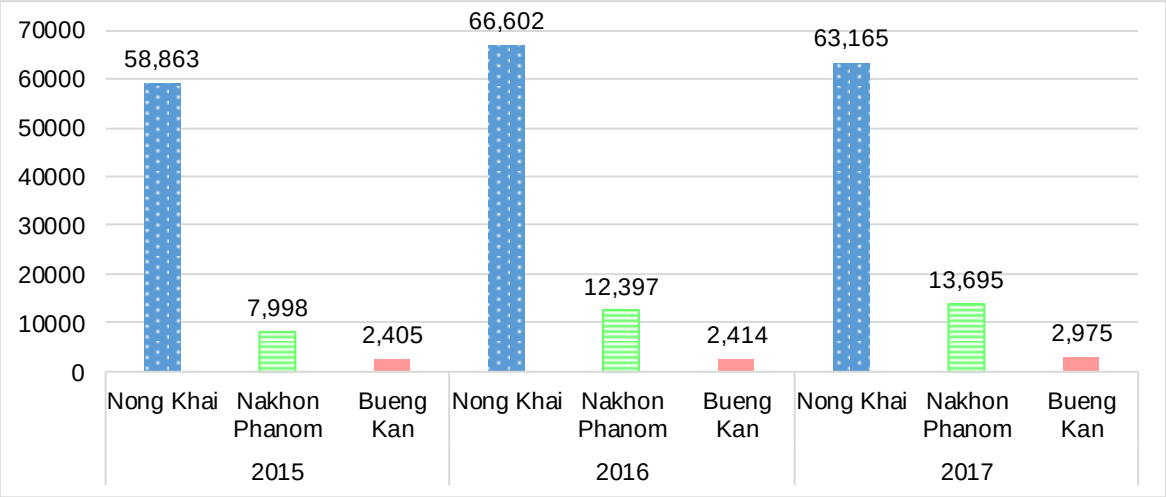
Table 6.1: Benefits of the 5th Mekong River Crossing Bridge Project

Year	Cost saving from vehicle used (฿ million)	Cost saving from travel time (฿ million)	Net income from border trading (฿ million)
2020	0.5	32.3	358.7
2021	0.6	33.5	370.6
2022	0.7	34.8	382.8
2023	0.6	36.3	395.2
2024	0.5	37.8	407.8
2025	0.4	39.3	420.6
2026	0.2	40.8	433.6
2027	0.1	42.3	446.8
2028	0.2	43.6	460.3
2029	0.2	45.0	474.0
2030	0.2	46.3	487.9
2031	0.2	47.7	502.1
2032	0.3	49.0	516.5
2033	0.2	50.6	531.1
2034	0.2	52.2	546.0
2035	0.1	53.8	561.2
2036	0.1	55.3	576.6
2037	0.1	56.9	592.2
2038	0.1	58.7	608.2
2039	0.2	60.5	624.4

Source: Department of Highways (2014).

More concretely, border trade in the vicinity of Bueng Kan province will enjoy greater benefits when the bridge opens to Thailand, and at the same time, Lao PDR travellers will save both time and costs. It is anticipated that the value of exports and imports at the Nong Khai, Bueng Kan, and Nakhon Phanom customs are likely to grow thanks to the 5th Mekong Bridge that will greatly enhance the physical connectivity between the two countries (Figure 6.4). It should be noted that, in particular, Beung Kan has relatively few imports and exports because currently transport to and from Beng Kan is only by ferry.

Figure 6.4: Total Value of Imports and Exports (฿ million)



Source: Department of Foreign Trade (2017).

The import and export customs statistics show that Nong Khai and Bueng Kan have the most imports and exports of petroleum and electrical energy. Nakhon Phanom has the highest value of imports and exports of processors and microchips, and telephone sets and cellular networks. It may be speculated that the goods crossing Nong Khai and Bueng Kan are mostly consumed and produced in the Lao PDR. The products exported and imported at Nakhon Phanom are usually exported and imported from Viet Nam and China, as shown in Table 6.2.

However, when the 5th Mekong Bridge is open to traffic, the value of imports and exports is expected to increase. Cross-border goods will be diverted to the new infrastructure, as it can accommodate more import and export volumes, and trade will flow smoothly with more choice of routes.

Table 6.2: Thailand's Top 10 Exports and Imports

	Nong Khai Customs		Bueng Kan Customs		Nakhon Phanom Customs	
	Exports	**Imports**	**Exports**	**Imports**	**Exports**	**Imports**
1	Petroleum oils	Electrical energy	Petroleum oils	Electrical energy	Processor and microchips	Telephone sets and cellular networks
2	Cars and other vehicles	Insulated wire and cables	Water, mineral water, and carbonated water	Woods	Foods	Computers and electronic devices
3	Trucks	Parts of footwear	Cars and other vehicles	Tea	Fresh fruit	Women's T-shirts and shirts
4	Water, mineral water, and carbonated water	Water, mineral water, and carbonated water	Beauty or make-up products	Manioc (cassava)	Dried longan fruit	Gas tanks
5	Motorcycles	Silicon metal	Cement	Chopsticks	Batteries	Printed circuit boards
6	Telephone sets and cellular networks	Electrical transformers	Electrical transformers	Lac and natural gums	Electrical energy	Fashion bags
7	Organic surface-active agents	Thermometers and pyrometers	Rice cookers and microwave ovens	Incense sticks	Petroleum and additives	Knitted or crocheted shirts for women
8	Pasta, spaghetti, and macaroni	Palm hearts (containing added sugar)	Monosodium glutamate (MSG)	Incense	Computer headsets	Clothing and accessories
9	Products used in animal feed	Thermostats	Shampoos and conditioners	Stone	Gas tanks	Chiffon and wool
10	Flat-rolled products of iron or non-alloy steel	Trucks	Glutinous rice	Bamboo sticks	Snacks	Knitted or crocheted shirts for men

Source: Department of Foreign Trade (2017).

3. Thailand's Economic Impact Assessment

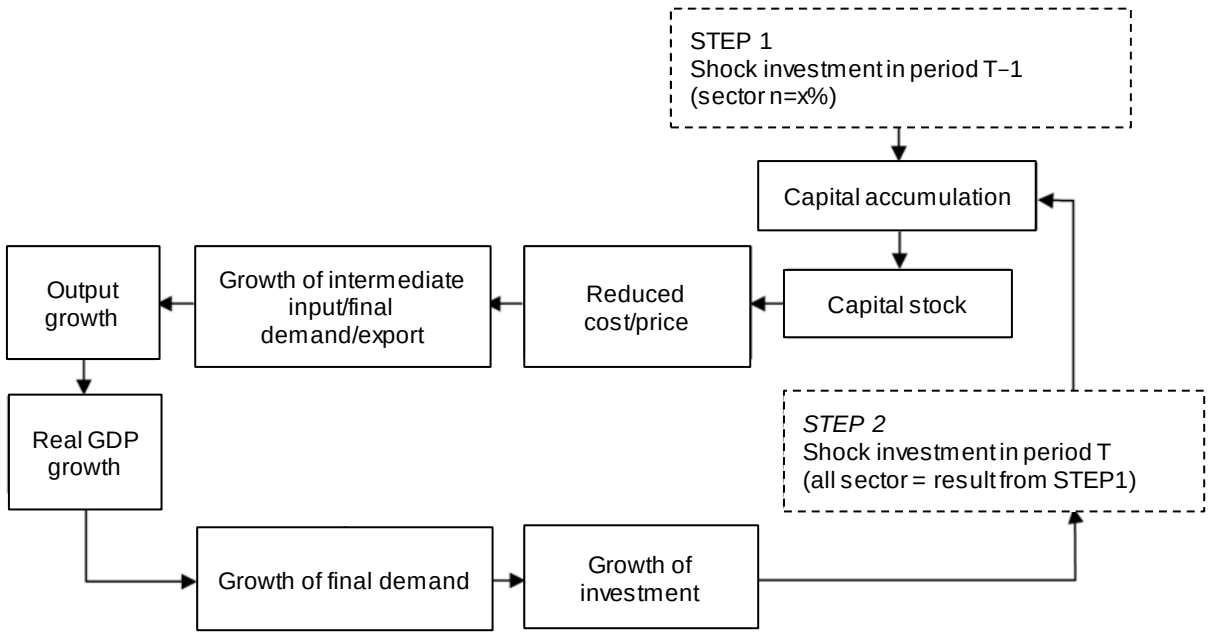
Logistics become increasingly important as the world economy develops. To keep up with the pace of development, countries must collaborate with their neighbours to improve the competitiveness of regional logistics. This section employs a computable general equilibrium (CGE) model to examine how such collaboration in the development of the VHE and the consolidation of 'Bangkok–Vientiane–Hanoi

industrial corridor' affect national economic growth and geographical distribution of income in Thailand.

As markets in real world economies are mutually interdependent, general equilibrium analyses provide important insights into the factors and mechanisms that determine relative prices and the allocation of resources within and between market economies. The CGE approach evaluates the physical and economic impacts of proposed expenditure plans in the near future by considering the direct and indirect benefits in other sectors of the economy. This is done by measuring the increased demand for goods and services used in other economic sectors (Gritsana and Sompote, 2017).

The impact cycle starts with an increase in investment as a source of production, the value added of goods and services, and real gross domestic product (GDP). The increase in the net current capital stock is the result of the growth in investment during the previous period. The decrease in the cost of production, driven by the increase in capital supply, is the source of the reduction in the cost of goods and services across the economy. Growth in real GDP is also stimulated by increases in exports, while the use of domestically produced goods and services become favourable as more import consumption is discouraged, as shown in Figure 6.5.

Figure 6.5: Growth Connection of the Economic System



GDP = gross domestic product.
Source: Author's compilation.

To assess the impact of regional collaboration on the development of cross-border transport infrastructure, this study sets three alternative scenarios:

Scenario 1: Eastern Economic Corridor (EEC)

Scenario 2: EEC + the 5th Mekong Bridge Project

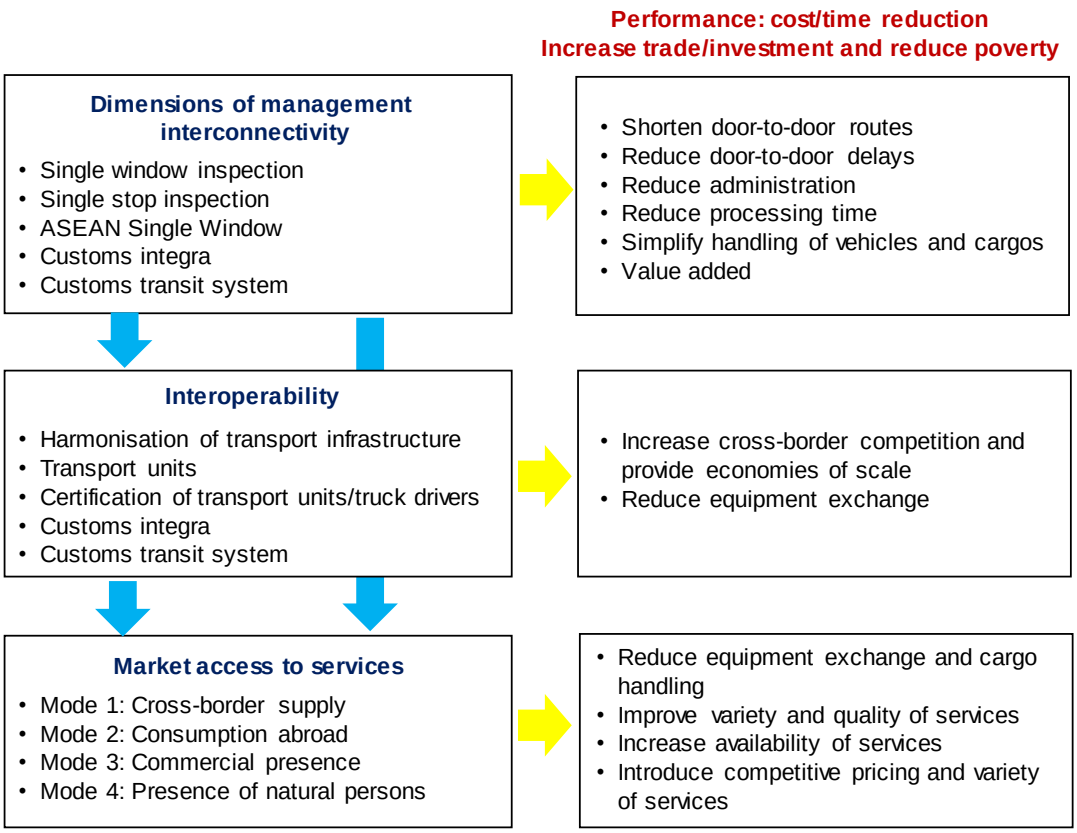
Scenario 3: EEC + the 5th Mekong Bridge Project + Special Economic Zone (SEZ) (Kanchanaburi)

The rationale behind setting up these three scenarios is as follows:

- Infrastructure connectivity is a necessary condition for trans-boundary economic impacts. The Bangkok–Vientiane–Hanoi Expressway fulfils this condition.
- Impacts through improved trade and passenger flows cannot be realised unless the countries along the corridor harmonise rules and regulations to accommodate and enhance logistics requirements for both freight and passengers.

Therefore, it is essential that countries along this corridor pursue a collaborative industrial policy that leads to the strengthening of the corridor's value/supply chain. Figure 6.6 depicts the dimensions of international transport and logistics performance improvement: interconnectivity, interoperability, and market access.

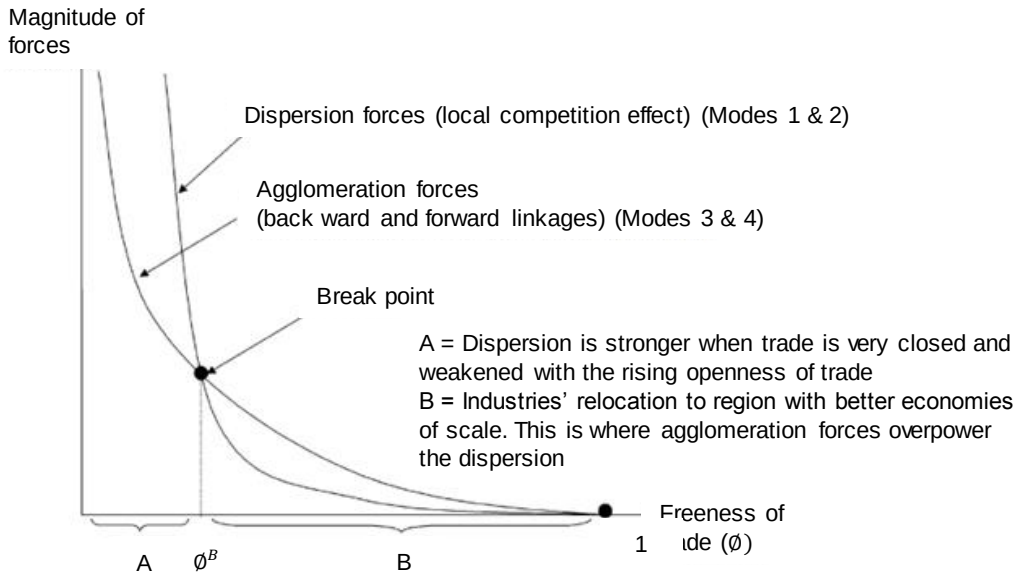
Figure 6.6: Dimensions of International Transport and Logistics Development



ASEAN = Association of Southeast Asian Nations.
Source: Author's compilation.

According to the General Agreement on Trade in Services (GATS), for a service to be produced or delivered effectively, proximity between the consumer and the supplier is often a necessary condition. Thus, in addition to the cross-border supply of services (mode 1), GATS covers service provision cases where consumers move outside their home territory (mode 2), suppliers move to the territory of consumers to provide their services by establishing a commercial presence abroad (mode 3), and services are provided through the presence of natural persons (mode 4). This study, based on Baldwin et al. (2002), demonstrates the interaction of these four modes in Figure 6.7. More generally, these four modes are grouped into two forces: dispersion and agglomeration forces.

Figure 6.7: Dispersion and Agglomeration Forces



Source: Baldwin et al. (2002).

Boxes 1 and 2, together with Figures 8 and 9, provide details of the EEC and SEZs. Figure 6.10 shows the linkages between the three scenarios mentioned above.

Box 1: The Eastern Economic Corridor Project

The Eastern Economic Corridor (EEC) Development Plan under the Thailand 4.0 scheme aims to revitalise and enhance the Eastern Seaboard Development Program, which supported Thailand as a powerhouse for industrial production for more than 30 years. The EEC development plan will lead significant development and transformation of Thailand's investment in physical and social infrastructure in three eastern provinces – Chachoengsao, Chonburi, and Rayong – as shown in Figure 6.8.

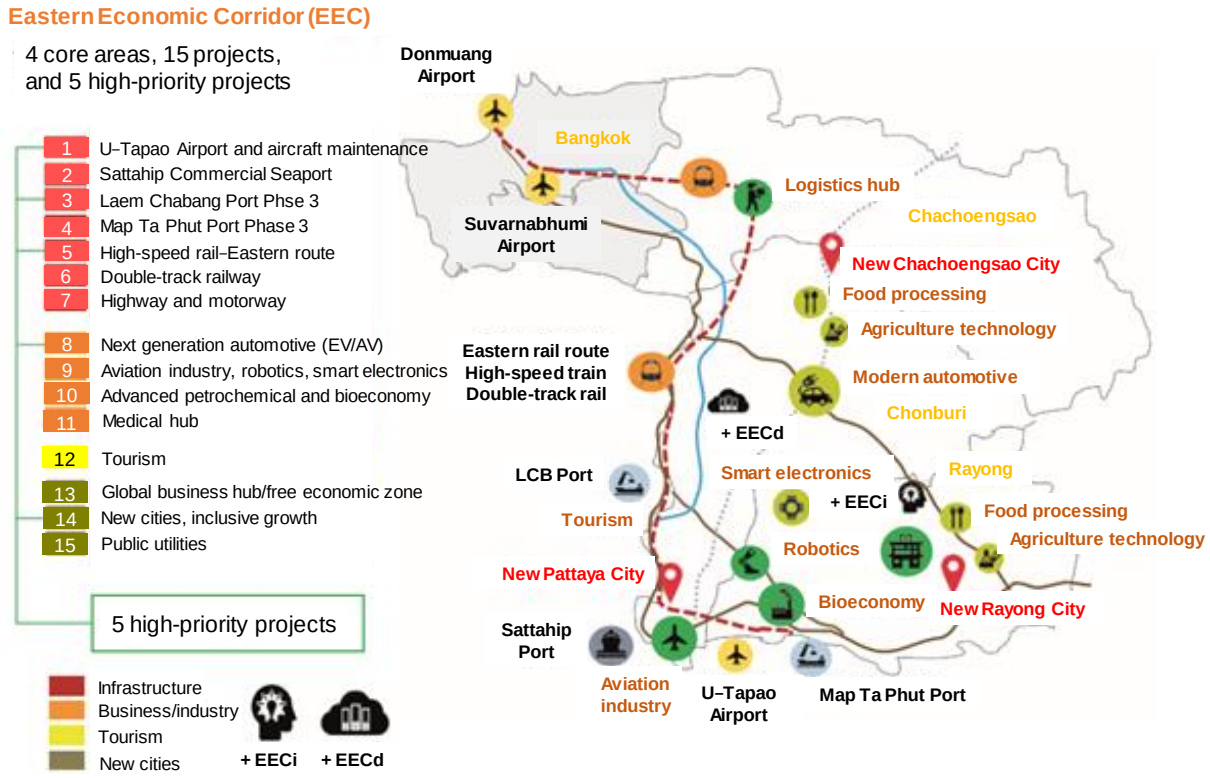
The EEC development plan has highlighted opportunities and investment trends in 10 key industries, which would improve Thailand's competitiveness. These 10 industries are divided into two categories: (i) first S-curve industries: next-generation automotive industry, intelligent electronics industry, advanced agriculture and biotechnology, the food processing industry, and high wealth and medical tourism industries; and (ii) new S-curve industries: digital industries, robotics, aviation and logistics, comprehensive healthcare, and biofuel and biochemical industries.

Statistics for the 2017 period show direct investments in the EEC region totalling 259 projects valued at ฿310.337 billion: Chonburi – 133 projects valued at ฿117.311 billion, Rayong – 93 projects valued at ฿162.751 billion, and Chachoengsao – 33 projects valued at ฿30.275 billion (EEC Office, 2018).

The EEC will connect Thailand with the Lao People's Democratic Republic (Lao PDR), China, and Cambodia through the infrastructure development of double-track railways. It focuses on the implementation of infrastructure development projects and seamless transport links. Large

infrastructure projects on the EEC development list include the Utapao airport expansion (฿215 billion), the Map Ta Phut deep seaport expansion (฿10 billion), the Laem Chabang deep seaport expansion (฿35 billion), double-track railways (฿64 billion), a high-speed train (฿64 billion), and a motorway (฿35 billion) (Lamonphet and Apornrath, 2017).

Figure 6.8: The Eastern Economic Corridor Project



AV = Autonomous Vehicle, EEC = Eastern Economic Corridor, EV = Electric Vehicle.
Source: EEC Office (2018).

Box 2: The Special Economic Zones Project

Special Economic Zones (SEZs) have been established in 10 Thai provinces. The first phase was in Tak, Mukdahan, Sa Kaeo, Trat, and Songkhla. The second phase was in Nong Khai, Narathiwat, Chiang Rai, Nakhon Phanom, and Kanchanaburi, as shown in Figure 6.9.

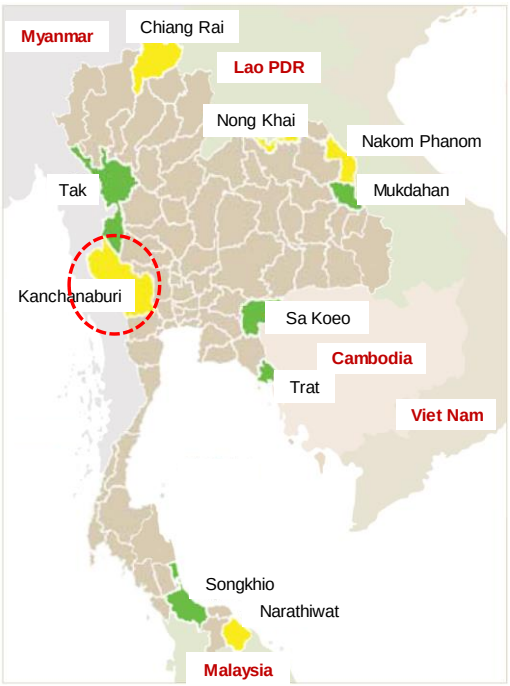
The Kanchanaburi SEZ location will be a logistics hub and production base alongside Dawei SEZ in Thailand's Eastern Economic Corridor (EEC), where the Thai government will provide infrastructure such as Highway No. 367; a motorway (Bang Yai–Kanchanaburi) project; and customs, immigration, and quarantine. The target industries are automotive, electronic, agriculture and food, and plastics. Shipping is accessible via Dawei Seaport to Indian Ocean economies, the Middle East, and Europe; and via Laem Chabang Seaport to Asia-Pacific economies (Thailand Board of Investment, 2015). Dawei SEZ would also strengthen the supply chain linkage with Thailand's Eastern Economic Corridor, providing opportunities for co-manufacturing linkages and inducing economic activities along the corridor.

Figure 6.9: Thailand's Special Economic Zones

Logistics hub and production base along Dawei Eastern–Economic Corridor (EEC)

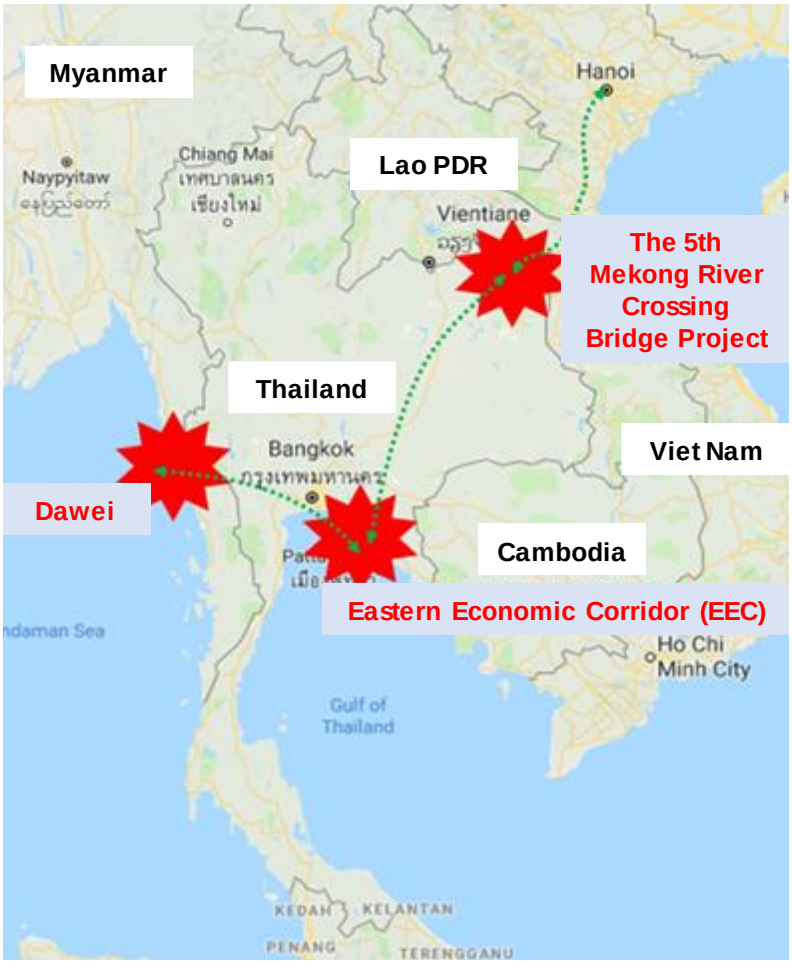
Target Activities

- Agricultural, fishery, and related industries;
- Ceramic products;
- Textile, garment, and leather industries;
- Furniture;
- Gems and jewellery;
- Medical equipment;
- Automotive, machinery, and parts;
- Electrical appliances and electronics;
- Plastic;
- Medicine;
- Logistics;
- Industrial estates/zones;
- Tourism-related industry



Source: National Economic and Social Development Board (2016).

Figure 6.10: Linkage of Dawei SEZ, Eastern Economic Corridor, and the5th Mekong River Crossing Bridge Project



SEZ = Special Economic Zone.
Source: Google Maps, modified by the author.

The CGE projection of the impacts of Thailand's industrial development strategies finds important contributions to real GDP growth. Table 6.3 shows simulation results for the three scenarios. Given the size of the investment in the EEC for scenario 1, investing in various sectors as formulated in the national industrial development strategies will promote the economy of the Bangkok–Vientiane–Hanoi corridor. Investing in the EEC accumulates capital in the industrial sector. This is an important driving force of the country's economic growth, which is based on exports. On the other hand, Thailand's industrial production still depends on intermediate inputs being imported from abroad. Increased production in the export sector causes imports of intermediate inputs from abroad to increase. Meanwhile, demand for labour increases, stimulating employment and improving wages. The increase in domestic consumption also affects the country's nominal GDP, which increases by

0.19%. Despite the higher consumer price index (CPI), Thailand's economy will continue to grow in terms of real GDP.

Comparison of the three scenarios indicates that more investment leads to higher inflation. The price of intermediate input and labour also rises because of the increased demand.

Table 6.3: Economic Impact of Thailand's Industrial Development

Variable	Percentage change (Δ%)		
	Scenario 1	**Scenario 2**	**Scenario 3**
Consumer price index	0.031001	0.031395	0.031677
Labour demand	0.177153	0.180874	0.183796
Total value of exports	0.350214	0.354074	0.354261
Total value of imports	0.338177	0.341928	0.342383
Nominal GDP	0.190142	0.192873	0.194793
Real GDP	0.164418	0.166817	0.168404

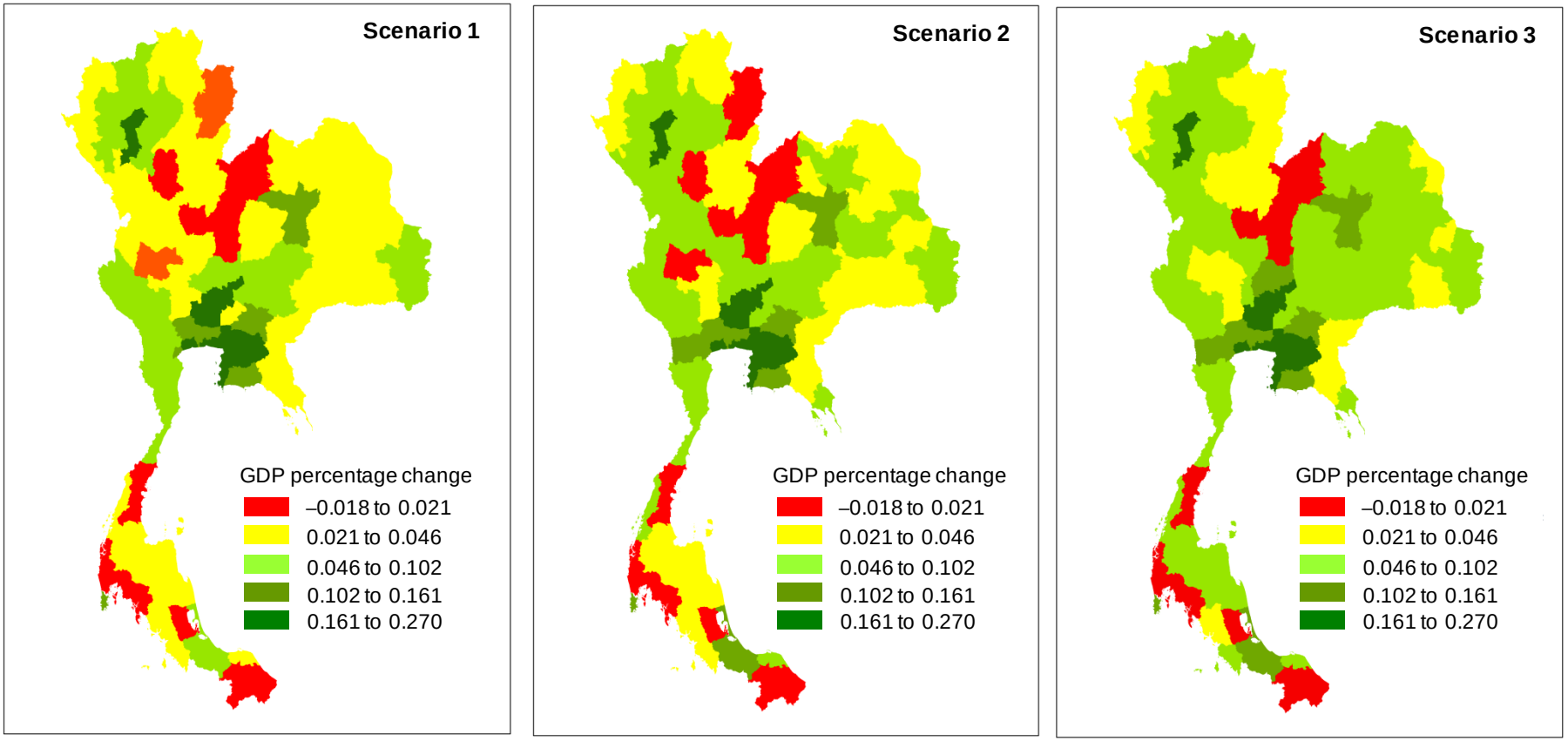
GDP = gross domestic product.
Note: The computable general equilibrium model is consistent with the 2010 edition input–output table, released by the National Economic and Social Development Board (2010).
Source: Author's calculation.

The geographical impact of industrial investment on gross provincial product (GPP) reflects the economic structure of each province. Investment in the projects of the EEC, SEZ in Kanchanaburi, and the 5th Mekong River Crossing Bridge will affect the GPP in accordance with the provincial production structure.

The provinces with the highest increase in GPP are Ayutthaya, Chachoengsao, Chonburi, and Lamphun, where many industrial estates are situated. This is particularly true for provinces where the majority production structure is in the automotive and electronics sectors, as shown in Scenario 1 of Figure 6.11. Scenario 2 develops the link between Thailand and the Lao PDR – the 5th Mekong Bridge Project – as it increases the efficiency of transport flow. International transport is expected to increase, so there is a chance of economic growth as a result of the higher trade volume. The geographical impact on income redistribution, measured by GPP, expands in many provinces because of the benefits of being the production base for suppliers' raw materials and goods for export to the Lao PDR at Bueng Kan border via the 5th Mekong Bridge. In Scenario 3, Thailand's industrial development strategies (the EEC and SEZ) and infrastructure development (double-track railways, motorway, and the 5th Mekong

Bridge) can expand the GPP of the areas along the economic corridor, resulting in increased economic growth. This is particularly true for the GPP of Bueng Kan province.

Figure 6.11: Geographical Economic Impacts of Thailand's Investment Plan



GDP = gross domestic product.
Source: Author's compilation.

Unlike the geographical simulation model, the CGE model used in this study is based on an input–output table of the Thai economy. Therefore, it is only applicable to Thailand. To reflect the rationale provided in Figures 6 and 7, this study explored the effect of collaborative industrial policies amongst the three connecting countries (Thailand, the Lao PDR, and Viet Nam) via external shocks on trade flow. Scenario 3 was used as the basis for showing the effect of trade flow increases of 10%, 20%, and 30%.

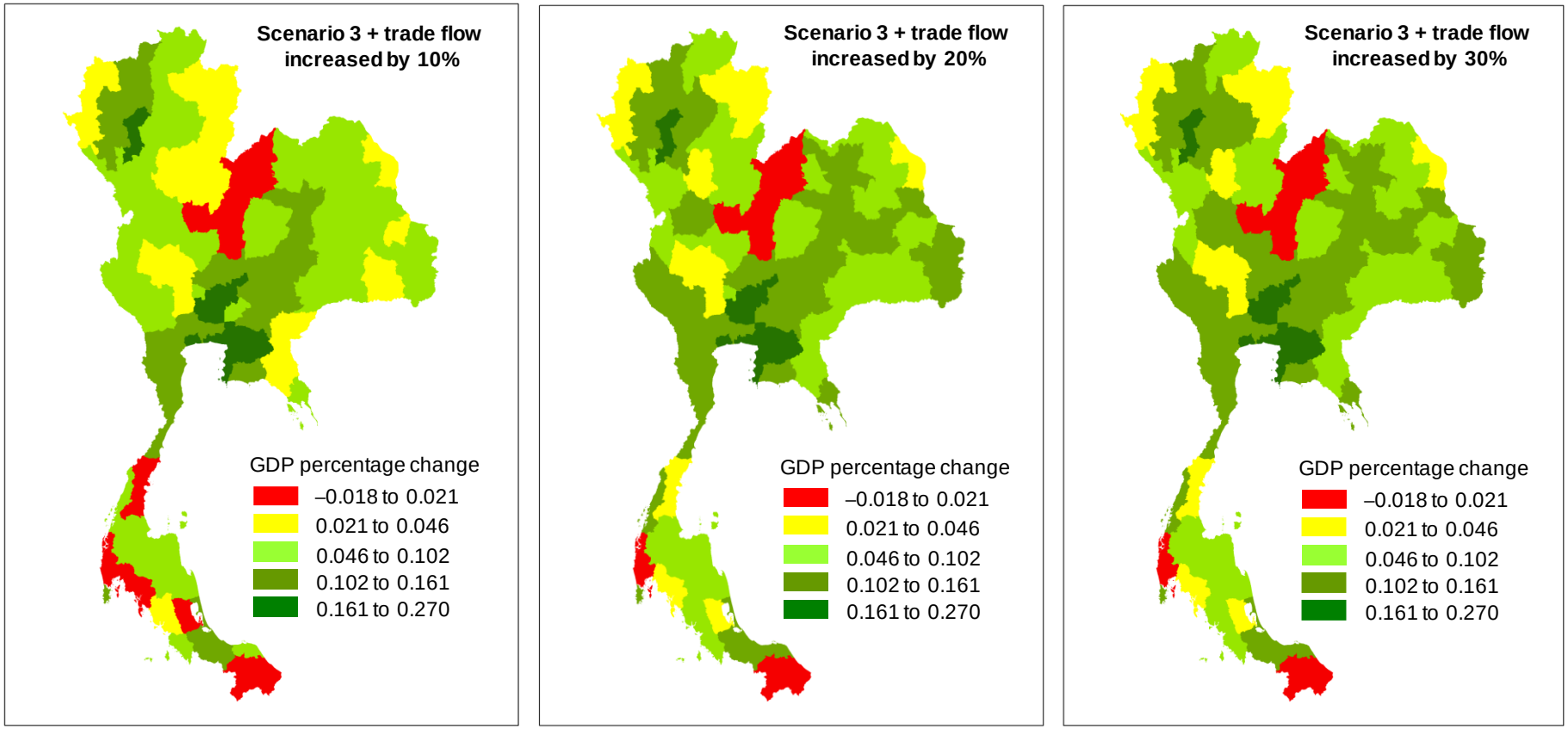
Table 6.4 depicts the trade flow cases based on collaborative industrial policies of Thailand, the Lao PDR, and Viet Nam. The main focus is on six major sectors: food processing and preserving, petroleum, chemical products, industrial machinery, electrical machinery and apparatus, and motor vehicles and repairs. The impacts of trade flow as well as industrial investment provide an important contribution to the growth of Thailand's economy, increasing real GDP. Trade flow increases of 10%, 20%, and 30% increase raise the real GPP by 0.181%, 0.183%, and 0.184% respectively. The GPP results are shown in Figure 6.12. The simulation analysis clearly shows positive impacts on the northeastern region of Thailand.

Table 6.4: Thailand's Economic Impact on Increasing of Trade Flow (Thailand–Lao PDR)

Variable	Percentage Change (Δ%)			
	Scenario 3 (EEC + the 5th Mekong Bridge + SEZ)	**Scenario 3 + trade flow increased by 10%**	**Scenario 3 + trade flow increased by 20%**	**Scenario 3 + trade flow increased by 30%**
Consumer price index	0.031677	0.033970	0.034743	0.034998
Labour demand	0.183796	0.196714	0.198842	0.200092
Total value of exports	0.354261	0.391027	0.395085	0.398481
Total value of imports	0.342383	0.377159	0.381085	0.384304
Nominal GDP	0.194793	0.209241	0.211792	0.213205
Real GDP	0.168404	0.181119	0.183024	0.184240

EEC = Eastern Economic Corridor, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, SEZ = Special Economic Zone.
Note: The computable general equilibrium model is consistent with the 2010 edition input–output table, released by the National Economic and Social Development Board (2010).
Source: Author's calculation.

Figure 6.12: Geographical Economic Impacts of Industrial Investment and Trade Flow



GDP = gross domestic product.
Source: Author's compilation.

According to scenario 3, industrial and infrastructure investment affects the productivity of each industry. The sectors that benefit are related to industrial investment in the EEC. Increasing productivity leads to economic growth and distribution to the corridor. In the case of industrial investment associated with the EEC in the Lao PDR and Viet Nam, it will also lead to more trans-shipment. However, whether the investment in the Lao PDR and Viet Nam increases or not is not clear from the model, as it is only possible to assume the trade flows.

The results are reported in a simulation of trade flow assumptions. Increases in trade flows of 10%, 20%, and 30% lead to increases in the total value of industry-specific sectors of 37.43%, 54.88%, and 64.81%, respectively, at Bueng Kan. This indicates that investment in the EEC, the 5th Mekong Bridge, and the SEZ (Kanchanaburi) – with increases in trade flow of 10%, 20%, and 30% – could increase net income from border trading to ฿858.12 million, ฿967.53 million, and ฿1,029.64 million respectively in 2039, as shown in Table 6.5.

Table 6.5: Net Income from Border Trading with Increased Trade Flow Assumptions

Year	Net income from border trading (฿ million)				
	Base case	**Scenario 3 (EEC + the 5th Mekong Bridge + SEZ)**	**Scenario 3 + trade flow increased by 10%**	**Scenario 3 + trade flow increased by 20%**	**Scenario 3 + trade flow increased by 30%**
2020	358.7	358.9	492.9	555.8	591.4
2021	370.6	370.8	509.4	574.3	611.2
2022	382.8	383.0	526.1	593.2	631.3
2023	395.2	395.4	543.1	612.3	651.7
2024	407.8	408.0	560.4	631.9	672.4
2025	420.6	420.8	578.0	651.7	693.5
2026	433.6	433.8	595.9	671.9	715.0
2027	446.8	447.1	614.1	692.4	736.8
2028	460.3	460.5	632.6	713.2	759.0
2029	474.0	474.2	651.4	734.4	781.6
2030	487.9	488.2	670.5	756.0	804.6
2031	502.1	502.3	690.0	778.0	827.9
2032	516.5	516.8	709.8	800.3	851.7
2033	531.1	531.4	729.9	823.0	875.8
2034	546.0	546.3	750.4	846.1	900.4
2035	561.2	561.8	771.2	869.6	925.4
2036	576.6	576.9	792.4	893.4	950.8
2037	592.2	592.6	813.9	917.7	976.6
2038	608.2	608.5	835.9	942.4	1,002.9
2039	624.4	624.7	858.1	967.5	1,029.6

Source: Author's estimates based on Department of Highways (2014).

The estimated direct benefit is derived from saving vehicle operating costs from traffic volume passing through the 1st Mekong Friendship Bridge (Nong Khai–Vientiane), the 3rd Mekong Friendship Bridge (Nakhon Phanom–Khammouane), and the 5th Mekong Friendship Bridge (Bueng Kan–Bolikhamsai) (Table 6.6 and Figure 6.13). This study assumes that traffic volumes have increased in line with economic growth and trade flows, and that all traffic used the VHE. The results show that the investment in the EEC, the 5th Mekong Bridge, and SEZ (Kanchanaburi) – with trade flow increases of 10%, 20%, and 30% – could save vehicle operating costs of ฿9,225.26 million, ฿10,063.92 million, and ฿10,902.58 million respectively in 2039.

Table 6.6: Traffic Volume and Vehicle Operating Cost Savings from Hanoi–Vientiane Expressway Development Project

Years	Traffic volume (cars per year)				Vehicle operating cost savings (฿ million per year)			
	1st bridge	3rd bridge	5th bridge	Total	1st bridge	3rd bridge	5th bridge	Total
Base case								
2024	637,310	105,761	98,721	841,792	2,125.2	244.2	265.9	2,635.3
2029	738,433	122,542	114,385	975,360	2,462.4	282.9	308.1	3,053.4
2034	856,018	142,056	132,600	1,130,674	2,854.5	328.0	357.1	3,539.6
2039	2,024,812	336,016	313,649	2,674,477	6,752.0	775.7	844.8	8,372.5
Scenario 3 (EEC + the 5th Mekong Bridge + SEZ)								
2024	638,383	105,939	98,887	843,210	2,128.8	244.6	266.3	2,639.7
2029	739,677	122,748	114,578	977,003	2,466.6	283.4	308.6	3,058.5
2034	857,460	142,295	132,823	1,132,578	2,859.3	328.5	357.7	3,545.6
2039	2,028,222	336,582	314,177	2,678,981	6,763.4	777.0	846.2	8,386.6
Scenario 3 + trade flow increased by 10%								
2024	702,222	116,533	108,776	927,531	2,341.7	269.0	293.0	2,903.7
2029	813,644	135,023	126,035	1,074,703	2,713.2	311.7	339.5	3,364.4
2034	943,206	156,525	146,106	1,245,836	3,145.2	361.4	393.5	3,900.1
2039	2,231,044	370,240	345,595	2,946,879	7,439.7	854.7	930.8	9,225.3
Scenario 3 + trade flow increased by 20%								
2024	766,060	127,127	118,665	1,011,852	2,554.5	293.5	319.6	3,167.6
2029	887,612	147,298	137,493	1,172,403	2,959.9	340.1	370.3	3,670.2
2034	1,028,951	170,754	159,388	1,359,094	3,431.2	394.2	429.3	4,254.7
2039	2,433,866	403,898	377,013	3,214,777	8,116.1	932.4	1,015.4	10,063.9
Scenario 3 + trade flow increased by 30%								
2024	829,898	137,721	128,553	1,096,172	2,767.4	317.9	346.2	3,431.6
2029	961,580	159,573	148,951	1,270,103	3,206.5	368.4	401.2	3,976.1
2034	1,114,697	184,984	172,670	1,472,352	3,717.1	427.1	465.1	4,609.2
2039	2,636,688	437,556	408,430	3,482,675	8,792.4	1,010.1	1,100.1	10,902.6

Source: Author's estimates based on Department of Highways (2014).

Figure 6.13: Route and Distance of Road Network (Thailand–Lao PDR–Viet Nam)

km = kilometre, Lao PDR = Lao People's Democratic Republic.
Source: Google Maps, modified by the author.

4. Conclusion

Thailand's industrial development strategies focus on direct investments in the EEC region valued at ฿310.337 billion. These include investments of ฿237.454 billion (77%) in the next-generation automotive segment, intelligent electronics, advanced agriculture and biotechnology, food processing, and high wealth and medical tourism. Other industries, valued at ฿72.883 billion (23%), comprise the digital, robotics, aviation and logistics, comprehensive healthcare, biofuel, and biochemical industries.

Thailand can definitely maximise the benefits of the VHE development project with industrial development, which requires investment in the economic corridor. The industrial development strategies of Thailand (the EEC and SEZ) and infrastructure development (double-track railways, motorway, and the 5th Mekong Bridge) will enhance the expansion of GPP in the areas along the economic corridor, resulting in increased economic growth. It is anticipated that the volume of trans-border traffic in Thailand and the Lao PDR will increase as a result of economic growth. Furthermore, the VHE project will increase transportation between Thailand, the Lao PDR, Viet Nam, and China, which support Thailand's EEC and SEZ.

Although the growth in traffic and trade flows is not obvious, the modelling results demonstrate better income redistribution in the border areas and provinces near the Lao PDR, which may have a spillover effect on neighbouring countries. The 5th Mekong River Crossing Bridge Project linking Thailand and the Lao PDR will also improve the efficiency of transport and hence trade flows. Cross-border transport is expected to increase in the case of advanced industrial development in the Lao PDR and Viet Nam, and the transport of goods related to the high-technology industry in the EEC is also likely to rise.

The economic impact on Thailand from the VHE development project will partly depend on industrial investment in the Lao PDR and Viet Nam, which are expected to benefit from the project. This would result in logistics redesign, and demand for imported and exported goods in Thailand would change accordingly. The simulation results regarding industrial investment and increases in trade flows indicate an important contribution to the growth of Thailand's economy. This will bring significant positive impacts, particularly to the northeastern region of Thailand.

Finally, the results of the analysis can be useful as supporting data for the government's decision making in prioritising, planning, and preparing transport and logistics development projects. The information is also useful for identifying the location of such development and prioritising the issues and areas to be addressed subsequently, so that grants are allocated to the most advantage and benefit to Thailand.

Policy advocacy must be considered to cope with potential changes in investment and achieve cross-border transport links as follows:

Government policies and investment projects. The economic impact assessment indicates that government investment in the projects is not always sufficient to generate a strongly positive outcome for every region of the Thai economy. According to the simulation results, in particular, development of the economic corridor with increased trade flow can reduce the inequality of the geographical distribution, especially along the corridor.

Modal shift and logistics management. The Government of Thailand has positioned effective logistics management as a key priority of its agenda to promote national competitiveness. Hence, logistics infrastructure, including the transportation network and its related services, needs to be developed urgently. This will require a modal shift strategy – a concept recognised by many developed and developing countries – to help reduce costs and provide service advantages. In light of rising oil prices, a country that is heavily dependent on road transportation of passengers and goods, like Thailand, should make an effort to reduce logistics costs to enhance its competitiveness. Rebalancing modes of

transport by shifting some traffic from roads with higher energy consumption to other less energy-intensive modes, such as railway and water transportation (inland water and coastal shipping), is also a good strategy to improve the competitiveness, apart from the development, of the economic corridor.

REFERENCES

Baldwin, R., R. Forslid, P. Martin, G. Ottaviano, and F. Robert-Nicoud (2002), 'The Core-Periphery Model: Key Features and Effects', in S. Brakman and B.J. Heijdra (eds.) *The Monopolistic Competition Revolution in Retrospect*. Cambridge: Cambridge University Press, pp. 213–35. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.454.1287&rep=rep1&type=pdf (accessed 19 February 2019).

Department of Foreign Trade, Thailand (2017), 'Border Trade Statistics and Cross-Border Trade in Thailand' (unpublished statistics).

Department of Highways, Thailand (2014), 'Feasibility Study of Economic Engineering and Environmental Impact Assessment and Detailed Design for the 5th Mekong River Crossing Bridge Project (Bueng Kan–Pak Xan)' (unpublished paper).

EEC Office (2018), 'Investment Statistics'. Bangkok: EEC Office. https://www.eeco.or.th/en/content/investment-statistics (accessed 19 February 2019).

Gritsana, P. and K. Sompote (2017), 'The Economic and Environmental Assessment of Thailand's Rail Transport Investment', *NIDA Development Journal*, 57(2), pp.239–70.

Isono, I. (2011), 'Possible Alternative Routes for Further Connectivity in the Mekong Region', in M. Ishida (ed.) *Intra- and Inter-City Connectivity in the Mekong Region*, BRC Research Report, No. 6. Bangkok: Bangkok Research Center, IDE-JETRO, pp.377–407.

Lamonphet, A. and P. Apornrath (2017), 'Who wants in on the EEC?', *Bangkok Post*, 9 October. https://www.bangkokpost.com/news/politics/1339203/who-want (accessed 19 February 2019).

Ministry of Commerce of the Republic of the Union of Myanmar, (2017), 'Dawei Special Economic Zone'. Yangon: Royal Thai Embassy. http://www.thaibizmyanmar.com/docs/Dawei%20SEZ.pdf (accessed 19 February 2019).

National Economic and Social Development Board (2010), Input−Output Tables 2010, Bangkok: Office of the National Economic and Social Development Council. https://www.nesdb.go.th/nesdb_en/more_news.php?cid=158&filename=index (accessed 14 March 2019).

National Economic and Social Development Board (2016), *Thailand's Special Economic Zones*. Bangkok: Office of the National Economic and Social Development Council. http://www.nesdb.go.th/ewt_dl_link.php?nid=5194 (accessed 19 February 2019).

Thailand Board of Investment (2015), 'A Guide to Investment in the Special Economic Development Zones'. Bangkok: Thailand Board of Investment. https://www.boi.go.th/upload/content/BOI-book%202015_20150818_95385.pdf (accessed 19 February 2019).

Thailand Development Research Institute (2011), 'Sharing the Benefits from Transportation Linkages and Logistics Improvements in the GMS: A Study of the East-West and North-South Corridor', final technical report submitted to the International Development Research Centre, 15 April 2011. https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/46334/132833.pdf (accessed 19 February 2019).

VietNamNet Online Newspaper (2017), 'Hanoi-Vientiane Highway to be Built', *VietNamNet,* 9 March. https://english.vietnamnet.vn/fms/society/174147/hanoi-vientiane-highway-to-be-built.html (accessed 19 February 2019).

Chapter 7
Financing and Burden Sharing Mechanism of the Vientiane–Hanoi Expressway

Narong Pomlaktong

1. Introduction

This chapter examines methods for setting up pragmatic models for investment in cross-border surface transport infrastructure. The focus is on the route connecting three major cities – Bangkok, Vientiane, and Hanoi – of neighbouring countries. The development transcends national borders and is regional in character. A strategic and operational framework for supplying international public goods and mobilising financial resources is thus crucial for successful cooperative development. This is because the costs and benefits of cross-border projects may be perceived as unequally distributed amongst the countries concerned, making the financial arrangements difficult to negotiate. This is especially true for transport infrastructure development projects, which are not always financially sustainable and often need government support. The challenge is, therefore, to agree on how to share the costs and benefits amongst the participating countries. Ultimately, taxpayers are better off if the project can be conditioned to be financially viable for private investment.

2. Goals of Transport Infrastructure Provisions

Transport infrastructure has a positive effect on the attractiveness, competitiveness, and economic growth of countries. Apart from opening up new business opportunities, it improves people's standard of living by facilitating access to essential resources such as schools, hospitals, and markets. There is, however, a growing gap between the need and actual level of investment in new transport infrastructure or the modernisation, operation, and maintenance of existing transport infrastructure. This is particularly true for developing countries.

Available funding from traditional sources falls short of investment needs. As a consequence, governments in both developed and developing countries around the world have been looking for alternative models to procure public services. One common aim is to find better ways to deliver services of the desired quality with the lowest burden possible on the public budget. The provision of public services involves performing a number of tasks. These include:

(i) defining the project objectives,

(ii) designing the infrastructure,

(iii) financing the project,

(iv) constructing the infrastructure,

(v) maintaining the infrastructure,

(vi) operating the facilities to provide the services, and

(vii) paying for the services.

This does not imply that the government must carry out all these tasks. Some of the tasks are 'sovereign' in that they are fundamentally the government's responsibility, and the government's role typically involves high-level decision-making regarding the use of public funds as well as the overall monitoring and regulation of outcomes. This is in contrast to 'operational' tasks, which need not be directly executed by the government. Traffic management, toll collection, and construction and maintenance services are examples. Whatever infrastructure tasks the government delegates to the private sector, providing infrastructure services with the available resources at the cheapest delivery cost is important.

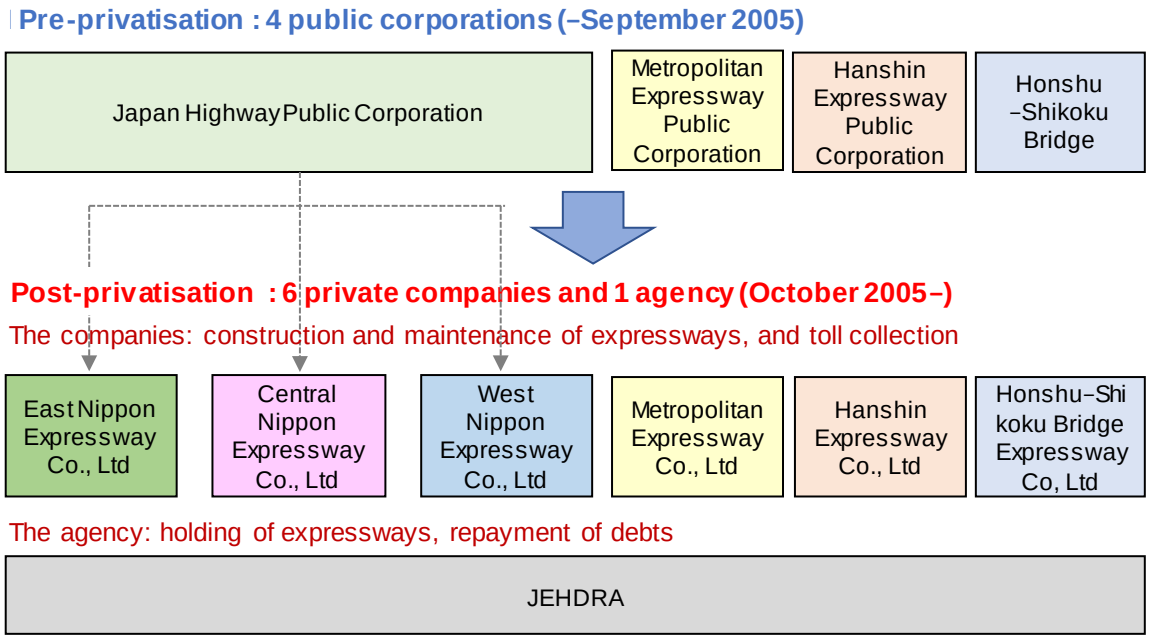
The following equation shows a possible mixed objective of enterprises that provide infrastructure. It assumes that private shareholders of the enterprise maximise profits while the public authority pursues welfare maximisation. The two groups of representatives arrive at a compromise, which is a mixed objective function where both profit and social welfare carry the %age weight of their respective supporters. The amount of x%age shareholding reflects the bargaining power in favour of welfare maximising, whereas the 1-x represents maximisation of profits.

$$\theta = x(CS + PS) + (1 - x)\pi$$

where CS = consumer surplus, PS = producer surplus, π = infrastructure operating firm's profit, x =%age representative of the government's proposed welfare maximising, and $1 - x$ =%age representative of the profit maximising of the firm operating the infrastructure.

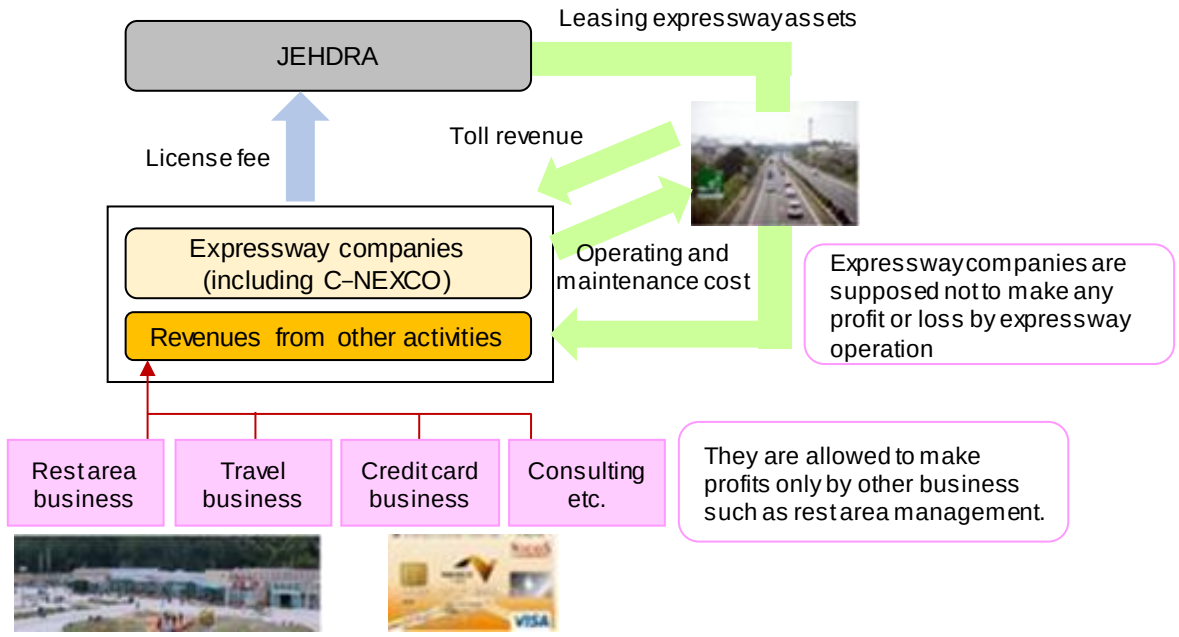
With good contract design, the mixed enterprise may opt to pursue welfare maximising regardless of the percentage share of the public. Japan offers a good example of how to pursue welfare maximising under the mixed enterprise arrangement. According to Morisugi (2006), Japan's motorway network has been developed by four main public corporations since the 1950s. Given their rising debts, at $350 billion, six private motorway companies were established in 2005. A holding company, Japan Expressway Holding and Debt Repayment Agency (JEHDRA), was also established as an independent administrative agency renting assets to the six private companies that are responsible for constructing and managing expressways and toll collection (Figure 7.1). The goal of JEHDRA is to repay debts over a 45-year period, then transfer the expressways back to the government and dissolve. The mission is to allow for a toll- and debt-free national expressway system. All six companies are allowed to make profits from related businesses but not from the expressway operations (Figure 7.2). This emphasises the importance of good contract design in successful infrastructure provision, including public–private partnerships (PPPs).

Figure 7.1: Institutional Arrangement of JEHDRA



Co., Ltd = company limited, JEHDRA = Japan Expressway Holding and Debt Repayment Agency
Source: Oi. (2012).

Figure 7.2: Framework of JEHDRA's Operations



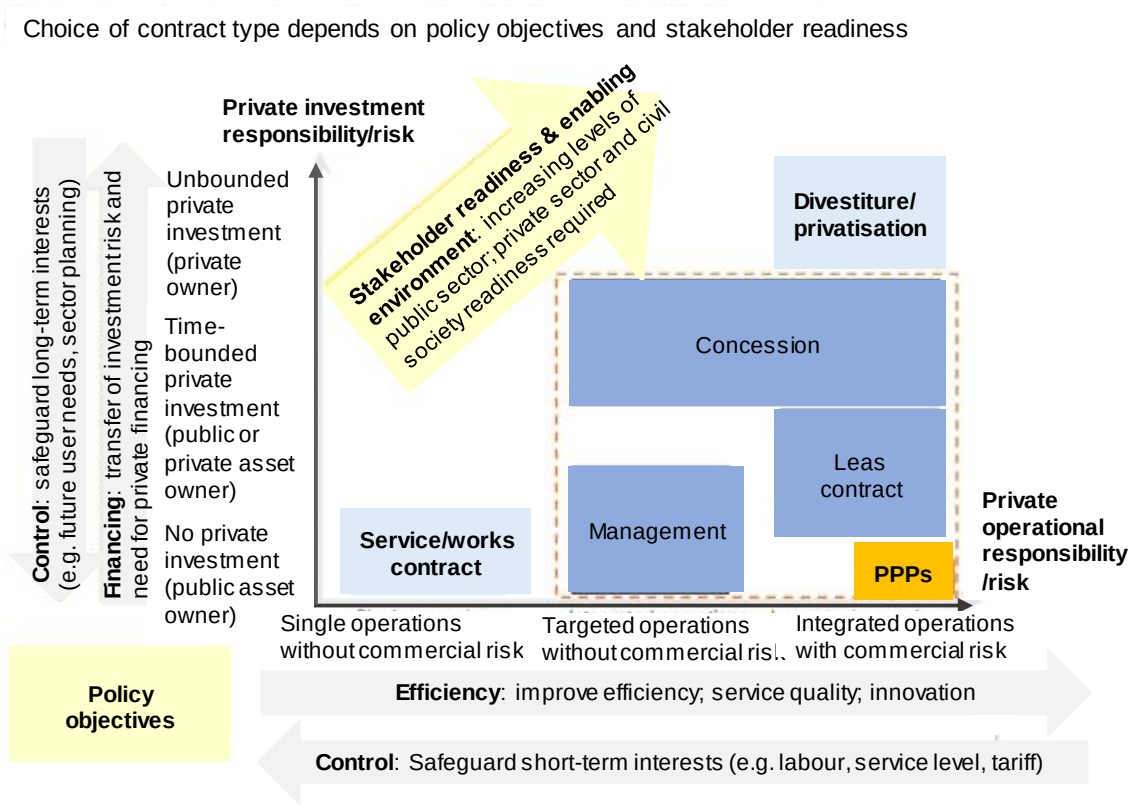
JEHDRA = Japan Expressway Holding and Debt Repayment Agency.
Source: Oi (2012).

3. Risks and Financing Options over the Project Life Cycle

Distinguishing between the two roles (sovereign and operation) has opened up various options for the provision of infrastructure. This depends on the extent to which the execution of operational tasks remains under direct political control. The highest degree of political control is observed when all the above-mentioned tasks are carried out by the government ministry using its own resources. Reducing government control can be done in two ways: outsourcing and devolution.

With outsourcing, the government is responsible for infrastructure provision but delegates the responsibility of some specified operational activities to private companies for a limited period based on contractual arrangements, while devolution refers to the transfer of responsibility for the provision of infrastructure to organisations that are not directly under the control of government officials. Outsourcing comes in many levels: contracting out, design–build arrangements, and PPPs. With varying degrees of independence, these include government state-owned enterprises, mixed companies, and private owner–operators. The choice of contract type depends on the policy objectives and degree of stakeholder readiness, as shown in Figure 7.3.

Figure 7.3: Choice of Contract Type



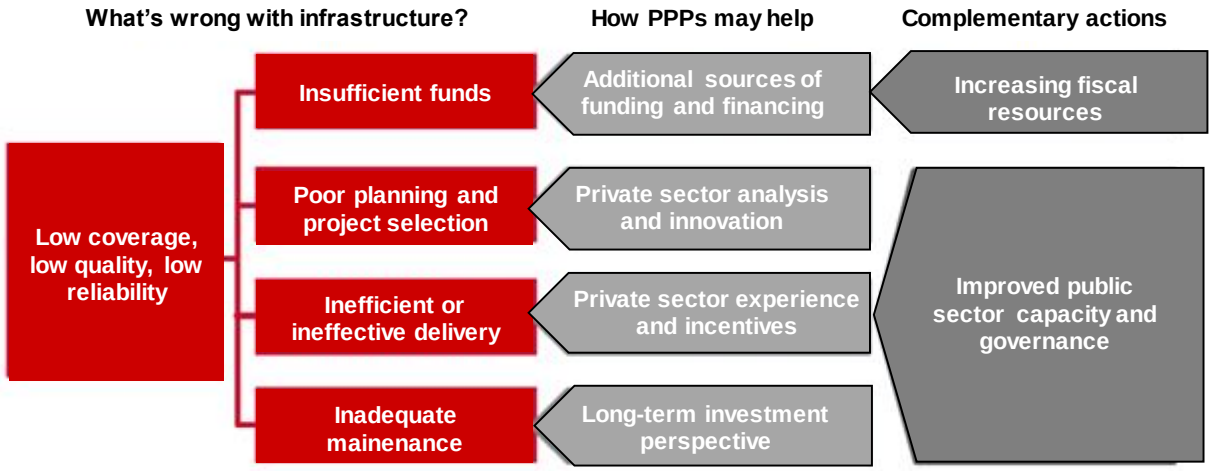
PPP = public–private partnership.
Source: World Economic Forum (2013).

The combination of outsourcing and devolution being employed to supply infrastructure becomes more complicated when the design and implementation involve more than one country. The decision on how to finance infrastructure is sovereign to the host country. The governments involved must decide on the level of public sector resources to be dedicated to transport infrastructure, compared with other prioritised socio-economic national agenda items. As far as feasible, infrastructure should be paid for by its users or ultimately by taxpayers if demand falls short. This kind of practice is common because transport infrastructure is a public good. However, for cross-border infrastructure, the means and amounts of resources to be channelled become crucial. According to Ray (2015), financing cross-border infrastructure involves countries with diverse financial capabilities and fiscal constraints. The level of public debt is critical to the country credit rating. Government debt in excess of a critical threshold impacts on the cost of all government borrowings. This increases the marginal cost of public funds for other sectors seeking investment. For these reasons, the option of PPP for infrastructure development can be useful.

Figure 7.4 shows various reasons why the private sector may be more efficient in carrying out operational activities than the government – resulting in successful PPP outcomes. These include:

- the private sector is more experienced in optimising the use of assets and their revenues;
- the focus on profit maximisation and shareholder value results in better financial discipline and accountability (Arndt, 1999); and
- innovative design and better construction materials and methods, combined with efficient operation and maintenance (O&M), result in lowering the overall project life cycle costs (Harris, 2004).

Figure 7.4: How PPPs Can Help



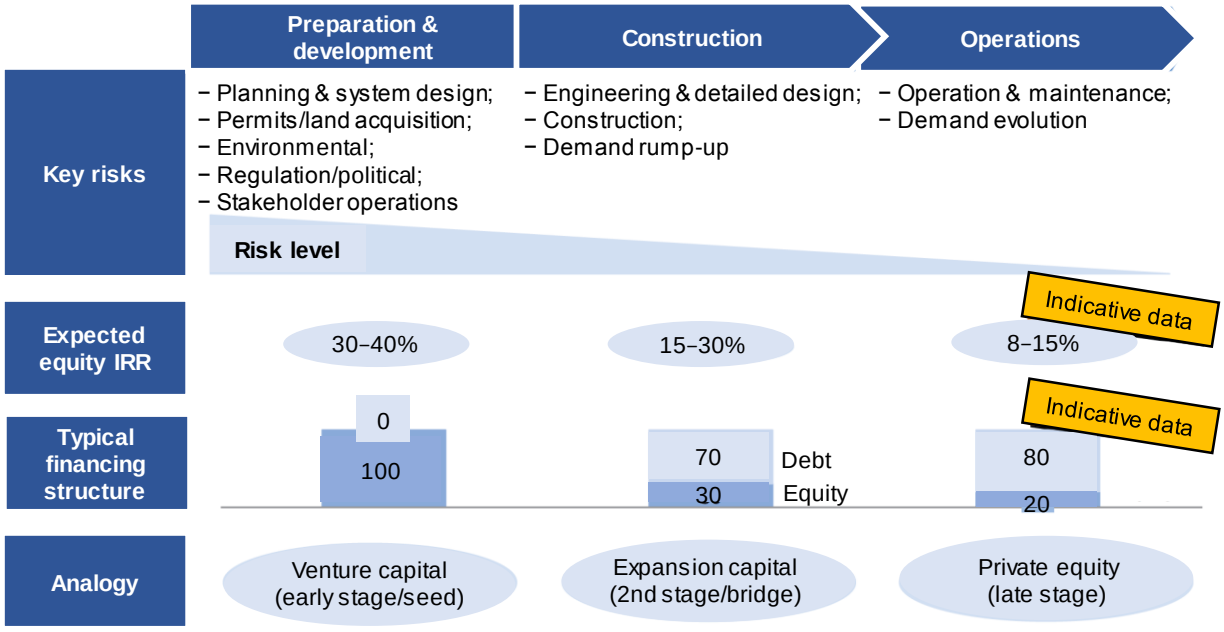
PPP = public–private partnership.
Source: International Bank for Reconstruction and Development/World Bank, Asian Development Bank, and Inter-American Development Bank (2014).

A typical infrastructure project involves a large initial investment that is sunk, together with O&M costs paid over the life of the project. During the operation of the project, the operator receives a stream of payments to cover both the initial investment (capex) and O&M expenses (opex). With PPP financing, the sources of finance can change over the project's life cycle, rather than having to stick to a government budget. During construction, expenses are financed with sponsor equity (which may be complemented with loans and subordinated or mezzanine debt) and bank loans. According to Yescombe (2007), banks exercise control over all changes to the PPP contract and tightly control the project company's behaviour. They are, therefore, well suited to lending during construction, whereas

bondholders are better suited to financing the project during its operational phase. This is because bondholders only have control over issues that may significantly affect the security of cash flows.

Regarding sharing of public–private financial commitments, the challenge is how to reach a reasonable agreement when the operation is socio-economically beneficial but not financially viable. This is common amongst various types of infrastructure development projects and is particularly true for transport infrastructure development. Infrastructure is designed for a long economic life, while its traffic only builds up gradually to the design capacity. This creates a host of risks and returns, and suggests that the revenue stream from operations may fall short. It is also common for the government to contribute to the funding of infrastructure projects from its budget pool at the expense of other public services. It would be different, however, if the capital market offered financing on a cycle equal to the investment cycle of the project. Figure 7.5 and Table 7.1 respectively depict these characteristics and the classification of three major risks facing each phase of the project life cycle.

Figure 7.5: Risk and Return Characteristics of Project Life Cycle Phases



IRR = internal rate of return.
Source: World Economic Forum (2013).

Table 7.1: Classification of Risk Linked to Infrastructure Assets

<table>
<tr><th>Risk category</th><th>Development phase</th><th>Construction phase</th><th>Operation phase</th><th>Termination phase</th></tr>
<tr><td rowspan="9">Political and regulatory</td><td>Environmental review</td><td>Collection of permits</td><td rowspan="2">Change in tariff regulation</td><td>Contract duration</td></tr>
<tr><td rowspan="2">Rise in pre-construction costs (longer permitting process)</td><td rowspan="2">Contract renegotiation</td><td>Decommission</td></tr>
<tr><td>Asset transfer</td></tr>
<tr><td colspan="3">Currency convertibility</td></tr>
<tr><td colspan="4">Change in taxation</td></tr>
<tr><td colspan="4">Social acceptance</td></tr>
<tr><td colspan="4">Change in regulatory or legal environment</td></tr>
<tr><td colspan="4">Enforceability of contracts, collateral and security</td></tr>
<tr><td rowspan="5">Macroeconomic and business</td><td>Pre-funding</td><td colspan="3">Default of counterparty</td></tr>
<tr><td colspan="2" rowspan="3">Financing availability</td><td>Refinancing risk</td></tr>
<tr><td>Liquidity</td></tr>
<tr><td>Volatility of demand/market risk</td></tr>
<tr><td colspan="4">Inflation</td></tr>
<tr><td colspan="4">Real interest rates</td></tr>
<tr><td colspan="4">Exchange rate fluctuation</td></tr>
<tr><td rowspan="6">Technical</td><td colspan="3">Governance and management of the project</td><td rowspan="5">Termination value different from expected</td></tr>
<tr><td colspan="3">Environmental</td></tr>
<tr><td>Project feasibility</td><td rowspan="2">Construction delays and cost overturns</td><td rowspan="2">Qualitative deficit of the physical structure/service</td></tr>
<tr><td>Archaeological</td></tr>
<tr><td colspan="3">Technology and obsolescence</td></tr>
<tr><td colspan="4">Force majeure</td></tr>
</table>

Source: Organisation for Economic Co-operation and Development (2015).

The choice between PPP and government borrowing should be based on the need to balance the socio-economic merits of the project and its financial profitability. For transboundary infrastructure development, the decision becomes more sensitive as it involves the value judgment and financial commitment of each participating government over a long period (e.g. 25–30 years). Moreover, the stages of capital market development in each participating country are diverse. Deciding on the sources of finance to be used depends on many criteria. These include the required rate of return, guarantees, conditions, and flexibility acceptable to the financial markets. Seeking the optimal terms and conditions of finance and coverage for the project is based on an analysis of the constraints and risks specific to each locality. The bankability of the project depends on how various risks are mitigated throughout the project life cycle. These are summarised in Table 7.2. The policy actions and tools may have some costs and side effects, which should be taken into account in seeking appropriate risk mitigation measures.

Table 7.2: Financial Risk Mitigation and Incentives

Type of measure	Instrument
1. Guarantees, realised directly by government or by its own controlled agency or development bank	1. Minimum payment, paid by controlling authority
	2. Guarantee in case of default
	3. Guarantee in case of refinancing
	4. Exchange rate guarantees
2. Insurance (private sector)	1. Wrap insurance, technology guarantees, warranties, commercial and political risk insurance
3. Hedging (private sector)	1. Derivatives contracts such as swaps, forwards, options, etc.
4. Contract design, paid by contracting authority	1. Availability of payment mechanisms
	2. Offtake contracts
4. Provision of capital, realised directly by government or by its own controlled agency or development bank	1. Subordinated (junior) debt
	2. Debt: 2.1. At market condition; 2.2. At lower interest rate
	3. Equity: 3.1. At market condition; 3.2. At more advantageous condition
5. Grants, generally delivered by contracting authority, even if a dedicated fund exists at the national level. Tax incentives can be delivered by national or local authorities.	1. Lump-sum capital grant
	2. Revenue grant: 2.1. Periodic fixed amount (mitigating the demand risk) 2.2. Revenue integration (it leaves the demand risk on the private player)
	3. Grant on debt interests
	4. Favourable taxation schemes for SPV
	5. Favourable taxation schemes for equity investors

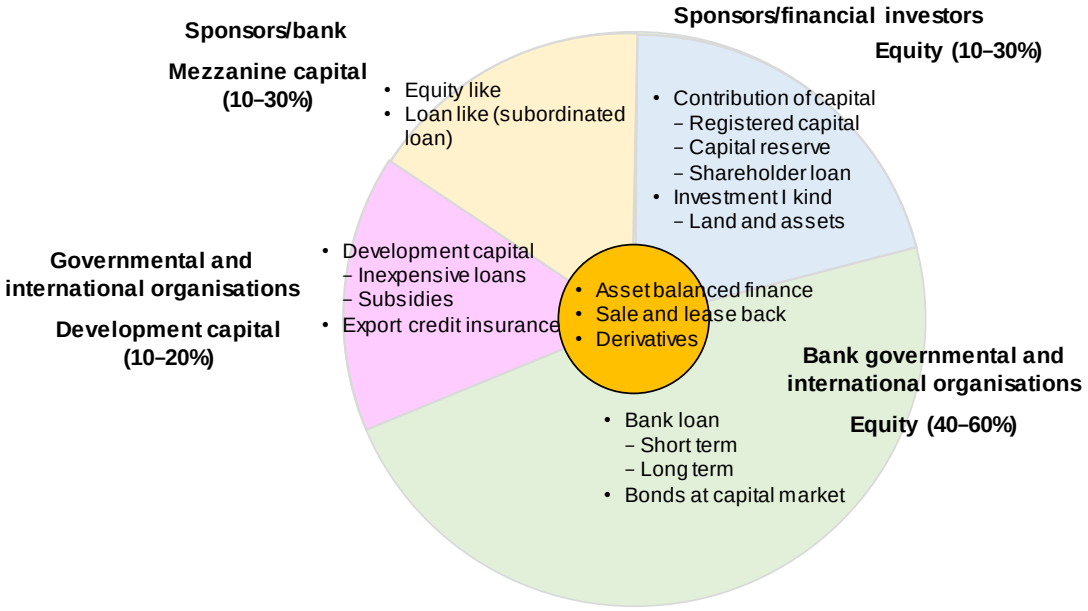
SPV = special purpose vehicle.
Source: Organisation for Economic Co-operation and Development (2015).

In project finance, the structure of the operating firm's liabilities stems directly from the project's ability to service its debts. The main measures proposed by the World Bank (2007: 241) are:

- Capital structure ratio = (equity + quasi equity) divided by all the financial resources invested. A capital ratio below 15% would likely lead the lenders to demand an increased equity or quasi-equity contribution from the sponsors.
- Annual debt service coverage ratio (ADSCR) = available cash flow for servicing the debt divided by the annual debt service. An annual ADSCR below 1.3 would require restructuring of a financing arrangement.
- Net present value debt coverage ratio (NPV DCR) = NPV of cash flow available for servicing the debt divided by its outstanding debt. The discount rate used in calculating the NPV is that of the average interest rates of the financial debts. An NPV DCR below 1.7 would run the risk of deterring potential private investors. Thus, the public financial contribution must increase.

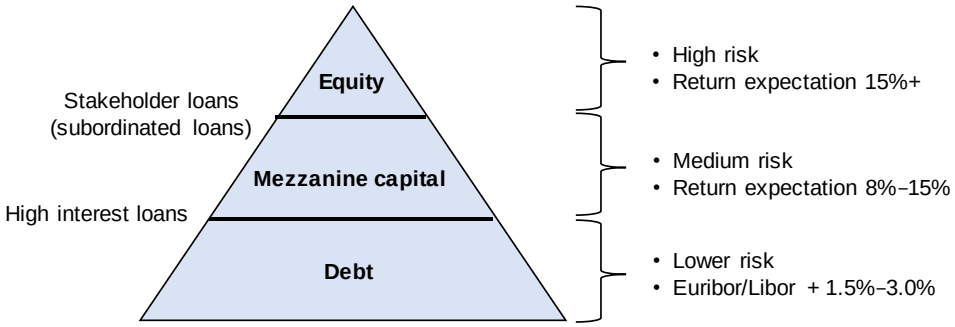
The three ratios enable assessing, from the outset, the amount of debt with limited recourse that is acceptable to banks. Weber and Alfen (2010) compiled the share of finance based on different sources used in infrastructure development. This is depicted in Figure 7.6, which shows that debt and equity are two of the most popular financing instruments. Figure 7.7 reveals the rationale behind Figure 7.6 – risk exposure is lowest where the investment fails, though the expected return on debt is also low.

Figure 7.6: Percentage of Financing Volume Used in Infrastructure Development



Source: Weber, Staub-Bisang, and Alfen (2016).

Figure 7.7: Risk Profile of Financing Instruments

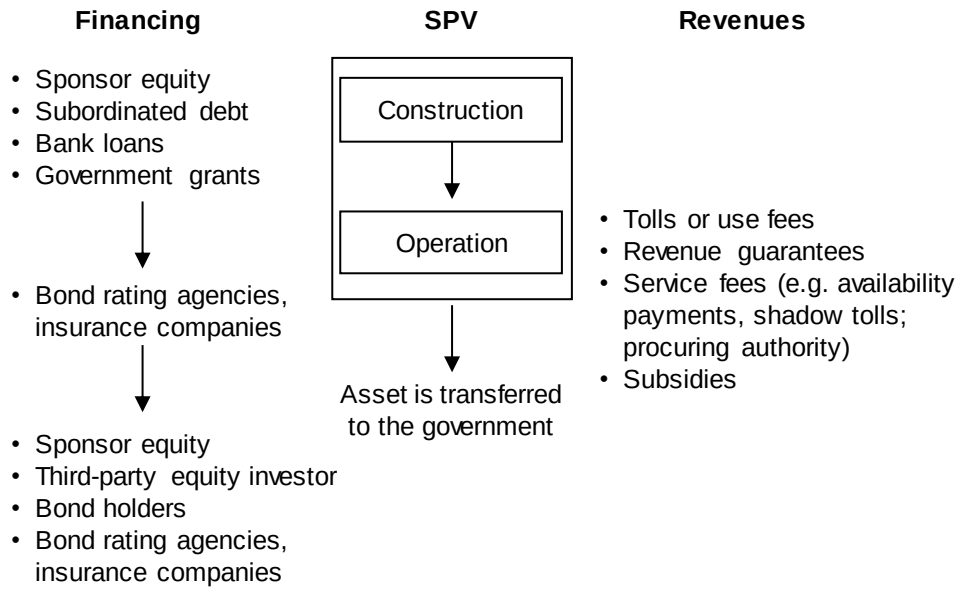


Euribor = Euro Interbank Offered Rate, Libor = London Interbank Offered Rate.
Source: Weber and Alfen (2010).

4. Financing the Provision of Infrastructure

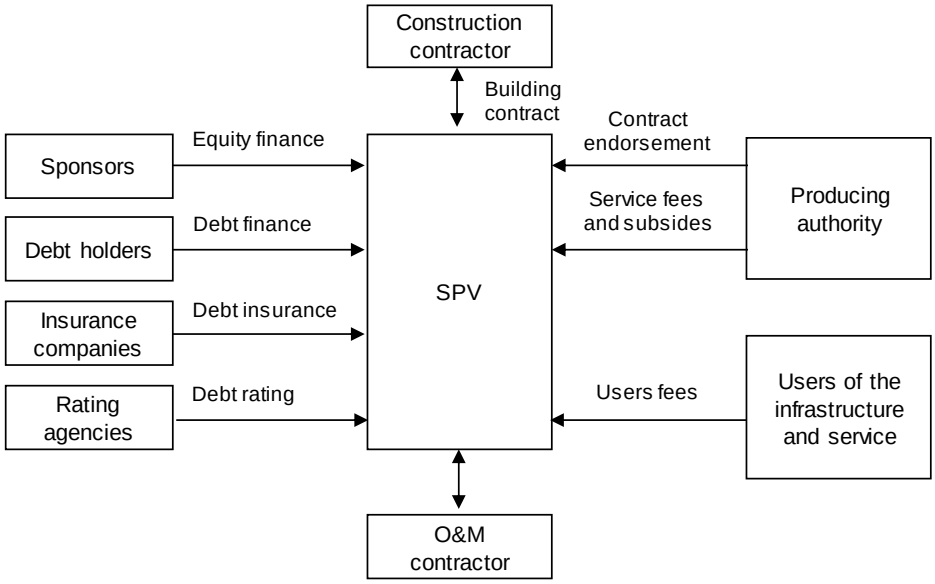
Yescombe (2007) pointed out that a financial technique called project finance, based on lending against the cash flow of a project, is both legally and economically self-contained. Some economic characteristics of most PPP projects include (i) high sunk costs with little value for the alternative usage, (ii) subcontracted tasks during construction and operation, and (iii) efficient bundling of construction and operation. Bundling incentivises investors to internalise O&M costs at the design stage to ensure that the project life cycle costs are minimised. The growth and spread of PPPs are thus closely linked to the development of project finance. To manage the three tasks mentioned above efficiently, without undertaking any business other than the construction and operation of the project, a special purpose vehicle (SPV) must be created. Figures 8 and 9 depict the typical financial life cycle and SPV arrangement of a PPP, respectively.

Figure 7.8: Financial Life Cycle of a PPP Project



SPV = special purpose vehicle, PPP = public–private partnership.
Source: Engel, Fischer, and Galetovic (2010).

Figure 7.9: Typical SPV Arrangement



O&M = operation and maintenance, SPV = special purpose vehicle.
Source: Engel, Fischer, and Galetovic (2010).

For transboundary infrastructure, financing schemes and organisational arrangements must be adapted to consider the institutional limitations and weaknesses in each participating country. Estache, Serebrisky, and Wren-Lewis (2015) have examined a number of factors that are important for developing countries when considering financing choices. They built a framework to analyse how a variety of factors which are important in developing countries may influence the source of financing used, i.e. public finance, private debt, and private equity. Table 7.3 depicts factors that could influence the financing source available for infrastructure development.

Table 7.3: Factors Influencing Financing Sources

Factors	Public finance	Public debt	Public equity
Cost of public funds	↓	↑	0
Cost of private debt	↑	↓	↑
Cost of private equity	0	↑	↓
Operational costs	↑	↓	0
Potential cost savings	0	↑	↑
Equity expropriation risk	↑	↕	↓
Exogenous risk	↑	↕	↓
Need for cross subsidies	↑	↓	0
Government discounting	↓	↑	0
Government favouritism	↑	↓	0

Note: The ↑ means that the factor increases the amount of that financing source that will be used, the ↓ symbol means that it decreases, and the ↕ symbol means that the effect is ambiguous. The last two rows correspond to the actions of an unconstrained non-benevolent government, but note that social welfare is improved by promoting financing in the other direction.
Source: Estache, Serebrisky, and Wren-Lewis (2015).

5. Institutional Arrangements and Burden Sharing Mechanism

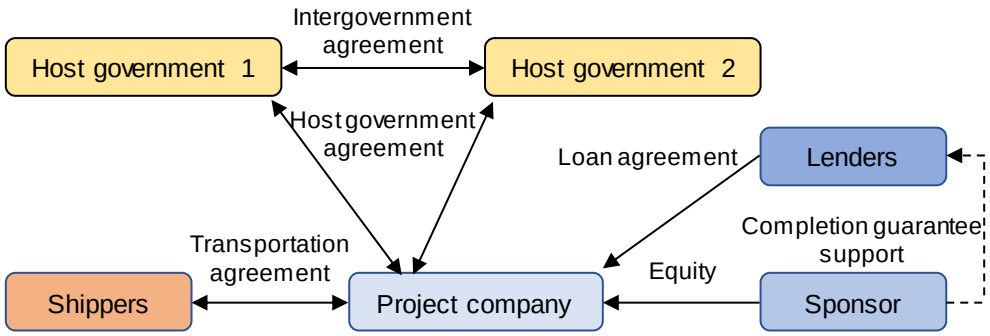
For cross-border infrastructure development, international pipeline projects present a high-risk profile for investors and lenders given their complexity and long-term horizon. Political risks are heightened when several countries are involved, and geopolitical considerations often interfere. Environmental and social issues may also generate significant delays. Transport infrastructure projects forming the Bangkok–Vientiane–Hanoi economic corridor could also be subject to a myriad of risks.

For land-linked countries such as the Lao People's Democratic Republic (Lao PDR), it is legitimate to raise questions regarding the benefits to the country based on its relatively few industries and production. Sharing the burden based on the proportionate length of road portion to be constructed in the Lao PDR might not be perceived as fair by the country. At the same time, countries like Thailand and Viet Nam may also argue that the expected gross domestic product (GDP) to be generated by the connectivity might be illusory, although many foreign companies located in both countries are the real beneficiaries of the above-mentioned transport infrastructure development. Economic assessment, based on the expected improvement of GDP stemming from the project, cannot be the only determining factor to share the investment burden amongst the potential beneficiaries. At the development stage, various parameters are subject to change contingent upon conditions such as the political, regulatory, technical, macroeconomic, and business environment. These will at least affect demand, trade flows, and hence the economic and financial return of the project. The appropriate

approach to deal with various inherent uncertainties is to set up an enterprise that is flexible enough to adapt to the changing conditions, yet able to ensure that the interests of stakeholders are well represented.

From a contractual point of view, this kind of project necessitates different agreements. These include an availability agreement to ensure that the infrastructure operating company gets paid as long as the infrastructure availability is intact. An intergovernmental agreement (IGA) amongst the involved governments is also concluded to establish the rights of the company for awarding the construction and operational services. Another type of agreement necessary for cross-border infrastructure development project is a host government agreement (HGA), to be signed by the infrastructure operating company with each host country, as shown in Figure 7.12.

Figure 7.10: Typical Transboundary Project Structure



Source: United Nations Economic and Social Commission for Asia and the Pacific (2017).

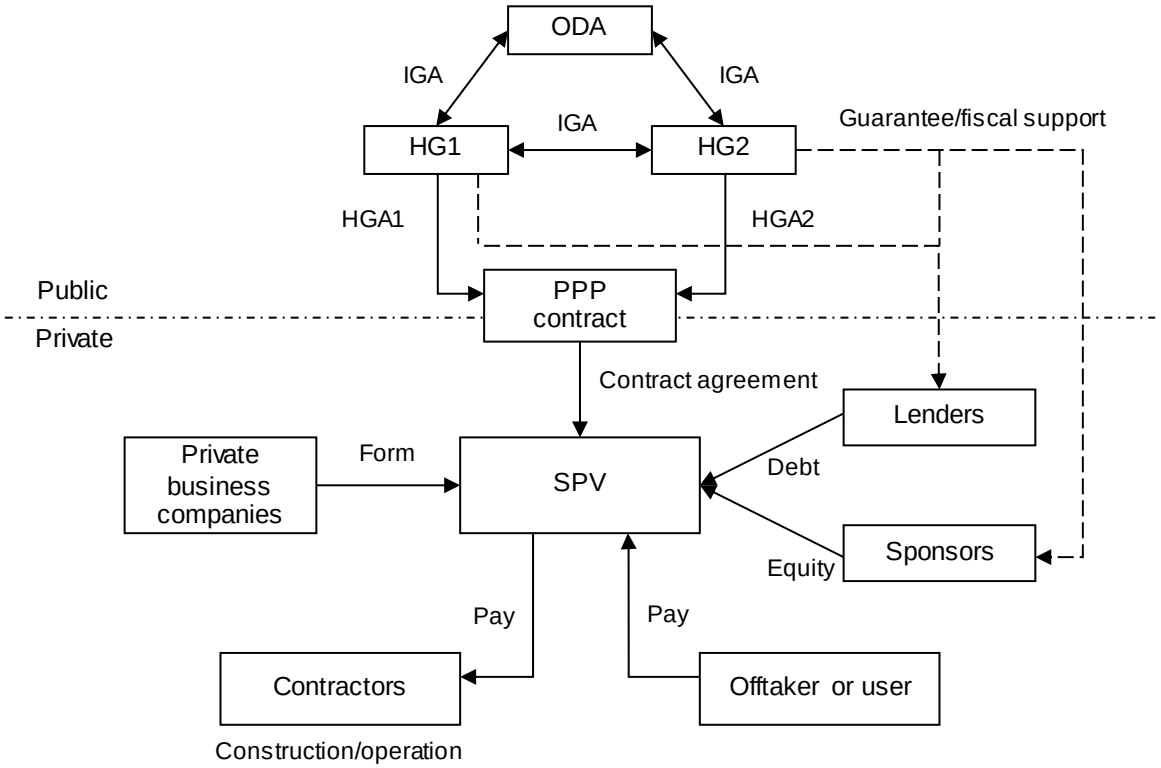
As mentioned above, various uncertainties can affect project viability. Thus, it is necessary to establish a mechanism to ensure that financial strategies and conditions are appropriately adjusted, taking into account stakeholders' interests. The steps of the contract design mechanism are as follows: (i) determine the amount of financing required for construction, management, and operation; (ii) enumerate the financing sources (e.g. public financing, public debt, and private equity) in accordance with the amounts, financial conditions, and costs; and (iii) select the financing source. If this step cannot generate a solution, adjust the amount of the source and restart from (i). If the amount cannot be increased, adjust the conditions for granting assets from the source and restart from step (ii).

It should be noted that the financing strategy mentioned is necessary but not sufficient to ensure successful project implementation. A good contract design has a clear allocation of responsibilities and risks between stakeholders, a workable price adjustment mechanism, performance-based measurement, fair rewards and penalties, appropriate contract duration, and a dispute settlement mechanism, all of which should be considered.

6. Financing Strategy for the Vientiane–Hanoi Expressway

Based on a typical SPV arrangement and a transboundary project structure discussed previously , Figure 7.11 proposes a PPP project structure for the Vientiane–Hanoi Expressway (VHE). It depicts interrelationships amongst the parties concerned: host governments and official development assistance agencies on the public side; and the SPV, private business companies, contractors, lenders, sponsors, and users on the private side.

Figure 7.11: Proposed Transboundary PPP Project Structure for the Vientiane–Hanoi Expressway



ODA = official development assistance, HG = host government, HGA = host government agreement, IGA = intergovernmental agreement, PPP = public–private partnership, SPV = special purpose vehicle.
Sources: Adapted from Zen and Regan (2014); United Nations Economic and Social Commission for Asia and the Pacific (2017; 2011).

The public side has two types of agreement: the IGA and the HGA. Both agreements aim to assist in facilitating project-specific negotiations and implementation, which make infrastructure projects foreseeable and transparent with respect to practices in cross-border infrastructure construction, operation, and investment. The alignment of both agreements is a necessary condition to shorten the lead time for the mobilisation of project-specific investment. This results in a reduction in the cost of project implementation. It is important to emphasise that the IGA and HGA are interdependent and are designed to represent a single package.

The IGA represents a treaty model which is governed by public international law. The treaty spells out the interrelationships amongst the states through whose territories an identified portion of the infrastructure system is to be constructed and operated. Issues dealt with by the IGA model include co-operation, the provision of land rights, the harmonisation of tax structures applicable to the project, and issues relevant to project implementation. On the other hand, the HGA model is an agreement between each state within whose territory a portion of the infrastructure system is to be realised and the project investors. The HGA model deals mainly with issues concerning the project activities within the territory of each state. The entry into force of the HGA is conditioned on the IGA by expanding on some of the issues identified in the IGA model. Issues dealt with in the HGA model include various governmental obligations (e.g. guarantee and fiscal support), investor duties, environmental and other relevant standards, liability, termination, and issues relevant to the implementation of the project in each territory.

It is important to note that the two models have to be structured with the aim of striking a reasonable balance between the obligations of the public side wishing to attract essential and/or competitive investment and the rights of private investors prepared to invest. The underlying principle is to enhance a sustainable allocation of risk (refer to previous discussion regarding Figures 5 and Tables 1 and 2) and fairness in the distribution of the overall benefits amongst parties engaged in the project.

The development of international transport and logistics includes the three dimensions of interconnectivity, interoperability, and market access. Increasingly, governments seek to cooperate across borders on transportation. The IGA and HGA facilitate the harmonisation of transport infrastructure as the interoperability dimension. Consequently, increasing cross-border transportation enhances performance and utilisation, such as cost and time reductions.

7. Stylised Financial Model

In general, the financial life cycle of a PPP project consists of two phases. The first is the construction phase, characterised by high sunk costs as well as little economic value for alternative usage. The second is dealing with O&M. Project finance is viable only in light of the size and volatility of the flows generated by the initiative. The project pays back its loans and pays out dividends to the SPV's shareholders with these operating cash flows. Where inflows fall short of operational costs, lenders have to resort to sponsors for subsidies. However, this needs to be specified in the HGA of each state for the terms and conditions to qualify for fiscal support from the host government. To be commensurate with the risk level associated with each phase, a host of financing elements and institutions has to be applied appropriately. These include sponsor equity, subordinated debt, bank loans, government grants, bondholders, bond rating agencies, and insurance companies. The parties involved and sources of financing depend on the activities and risks at different stages of the project life cycle. This was discussed previously in relation to the financial life cycle of a PPP project and a typical SPV arrangement in Figures 8 and 9, respectively.

This section employs a financial model which incorporates various financing instruments with a hypothetical %age of financing volumes for a PPP project. The objective is to assess, based on a number of scenarios and operating conditions, how each financing element is related and how the viability of the project will alter subject to different terms and conditions facing each host government. To date, information regarding the terms and conditions referred to above has not been readily available for testing. This section has, therefore, hypothesised a set of parameters to be tested, which are included in Tables 7.4 to 7.6.

Table 7.4 depicts three sources of funding: (i) equity and mezzanine capital supported by a government grant, e.g. granting the lessee the right to occupy and make use of the land but only during the term of the lease, with the right terminating when the lease expires; (ii) debt for construction credited by lenders or banks; and (iii) development capital contributed by the host government. The cost of capital involves two types of expenditure: initial investments and construction costs (Table 5). During the operating period, O&M costs consist of (i) maintenance, (ii) salaries, (iii) power and consumables, and (iv) others (Table 6. All costs are assumed to grow at market growth rates.

Table 7.4: Financing Structure

Financing structure	Amount ($ million)	Share* (%)
Equity and mezzanine capital	1,200	30
Debt (for construction costs)	2,000	50
Development capital (for land purchase)	800	20
Total project	**4,000**	**100**

* Share is a hypothetical structure.
Source: Author's calculation.

Table 7.5: Cost of Capital

Cost of capital	Amount ($ million)	Share* (%)
Initial investments		
Land purchase	800	20.0
Machine, equipment	1,080	27.0
Site preparation	60	1.5
Others	60	1.5
Total initial investments	**2,000**	**50.0**
Construction costs	**2,000**	**50.0**
Total project	**4,000**	**100.0**

* Share is a hypothetical structure.
Source: Author's calculation.

Table 7.6: Annual Operation and Maintenance Costs

Operation and maintenance costs	Amount ($ million)	Share* (%)
Maintenance	112	70
Salaries	32	20
Power and consumables	8	5
Others	8	5
Total O&M costs	**160***	**100**

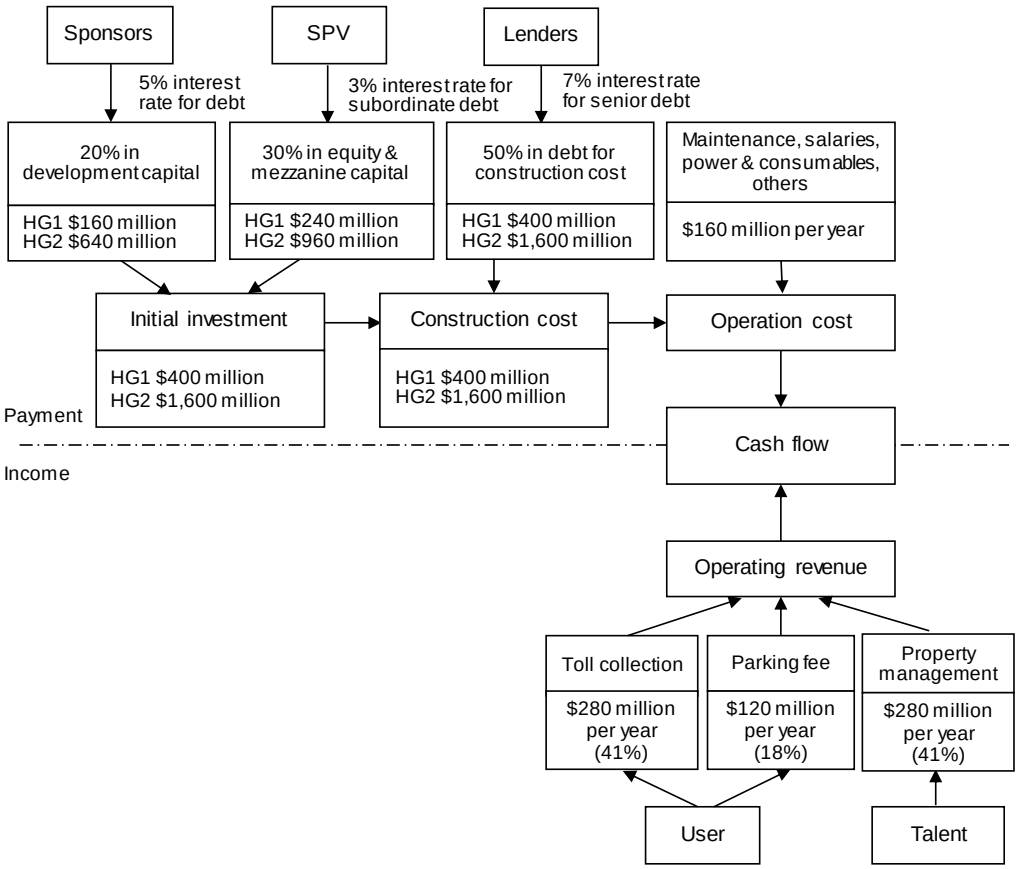
O&M = operation and maintenance.
* Share is a hypothetical structure.
Source: Author's calculation.

The financial model assumes 25 years as the project period, 2 years as the construction period, 5.4% as the discount rate (equal to the weighted average cost of capital (WACC)), 5.0% as depreciation, 7.0% as the market growth rate, 7.0% as the interest rate of senior debt, 3.0% as the interest rate of subordinated debt, and 5.0% as the interest rate of official development assistance (given the equal

interest rate for both host governments). The share of the cost of capital between host government 1 (Government of Viet Nam) and host government 2 (Government of the Lao PDR) in the SPV is assumed to be 20:80, respectively. This share is based on the length and hence the construction cost in each host country.

The model is illustrated in Figure 7.12. The cost of capital comprises 20% in development capital, 30% in equity and mezzanine capital, and 50% in construction costs, which are hypothetical structures. The output of modelling, i.e. internal rate of return (IRR), NPV, and payback period, is determined by the interest rate. The increase in the debt interest rate extends the years of debt redemption (including the payback period). The change in the operating revenue and cost drives cash flow changes throughout the project period. There are three sources of revenue: toll collection, parking fees, and property management.

Figure 7.12: Relationship amongst Financial Elements/Institutions in the Model



HG = host government, SPV = special purpose vehicle.
Note: The project budget, share, operation cost, and revenue are hypothetical structures.
Source: Author's compilation.

Two cases were tested in this section. Case 1 assumed an equal interest rate for both host governments as the base case. Scenario I tested a 3% increase of the base interest rate during construction. Scenario II explored a drop from 7% to 1% in the market growth rate. Case 2 is the most likely condition (different interest rate for both host governments) where the share of the cost of capital between host government 1 (Government of Viet Nam) and host government 2 (Government of the Lao PDR) in the SPV is 20:80, as detailed in Table 7.7.

Table 7.7: Test Case/Scenario

Case/Scenario	Test Case/Scenario
Case 1: Equal interest rate for both host governments	
Scenario I	Interest rate of senior debt increases by 3% from 7% during construction
Scenario II	Growth rate of users dropped from 7% to 1%
Case 2: Most likely condition (different interest rates for both host governments)	Interest rate of senior debt of Viet Nam is 7% Interest rate of senior debt of the Lao PDR is 6.6% (minimum lending interest rate of commercial banks in the Lao PDR)

Lao PDR = Lao People's Democratic Republic.
Source: Author's compilation.

The estimated results for case 1 are an IRR of 17.1%, an NPV of $11,729 million, a WACC (equal discount rate) of 5.4%, and a payback period of 8.6 years. For scenario I, increasing the interest rate of construction results in extending the years of senior debt redemption (construction costs), increasing the WACC, and raising the debt–equity ratio. In scenario II, the effect of decreasing demand results in extending the payback period, the years of all debt redemption, and reducing the NPV and IRR. In case 2, the most likely condition, the NPV is $12,083 million, the WACC is 5.2%, the payback period is 8.6 years, and the years of senior debt redemption of the Lao PDR are shortened, as shown in Table 7.8. Details of all the scenarios' estimated cash flows are in the Appendix.

The vital financial indicators are the years of debt redemption (including the payback period), which increase the debt interest rate – extending the years of debt redemption. Consequently, the project's operating service requires fiscal support from the government. Moreover, the revenue from operations must be used for debt service before paying a dividend to shareholders. In the case of demand falling short of the estimate specified in the HGA, the SPV should be compensated. These conditions should be clarified from the outset and included in the HGA.

Table 7.8: Project Summary

Financial indicators	Case 1			Case 2
	Base case	Scenario I	Scenario II	
IRR	17.1%	17.1%	11.8%	17.1%
NPV	$11,729 million	$9,165 million	$8,127 million	$12,083 million
WACC	5.4%	6.9%	5.4%	5.2%
Payback period in years	8.6 years	8.6 years	9.5 years	8.6 years
Capital structure ratio	50%	50%	50%	50%
Debt–equity ratio (lower–upper)	0.02–1.17	0.04–1.20	0.05–1.17	0.004–1.17
ADSCR (lower–upper)	1.00–17.37	1.00–9.41	1.00–4.90	1.00–85.50
NPV DCR (lower–upper)	0.16–91.74	0.11–50.84	0.12–42.34	0.12–455.13
Years of senior debt redemption	12 years	14 years	15 years	12 years
Viet Nam (host government 1)	12 years	14 years	15 years	12 years
Lao PDR (host government 2)	12 years	14 years	15 years	11 years
Years of subordinated debt Redemption	10 years	10 years	12 years	10 years
Viet Nam (host government 1)	10 years	10 years	12 years	10 years
Lao PDR (host government 2)	10 years	10 years	12 years	10 years
Years of equity redemption	11 years	11 years	13 years	11 years
Viet Nam (host government 1)	11 years	11 years	13 years	11 years
Lao PDR (host government 2)	11 years	11 years	13 years	11 years

ADSCR = annual debt service coverage ratio, IRR = internal rate of return, Lao PDR = Lao People's Democratic Republic, NPV DCR = net present value debt coverage ratio, WACC = weighted average cost of capital.
Source: Author's compilation.

8. Conclusion

This chapter proposed a transboundary PPP project structure for the Hanoi–Vientiane Expressway. A financing model was used to explore terms and conditions, with a varying financing structure, cost of capital, and O&M costs. A stylised financial model, depicting the relationship amongst financial elements and institutions, was proposed to examine the viability of the project via three important measures as proposed by the World Bank (2007). The implication of this section is that the parties involved can propose the terms and conditions that seem to best fit the respective objectives of each party and country. To draft an agreement and contract for the whole project, however, pragmatic terms and conditions must be reached. This chapter provided an alternative tool to help seek such an agreement.

References

Arndt, R. (2000), 'Is Build-Own-Operate-Transfer a Solution to Local Governments' Infrastructure Funding Problems?', *Australian Civil Engineering Transactions*, 42, pp.19–25.

Engel, E., R. Fischer, and A. Galetovic (2010), 'The Economics of Infrastructure Finance: Public–Private Partnerships versus Public Provision', *Public and Private financing of Infrastructure: Evolution and Economics of Private Infrastructure Finance*. EIB Papers, 15(1), pp.40–69.

Estache, A., T. Serebrisky, and L. Wren-Lewis (2015), 'Financing Infrastructure in Developing Countries', *Oxford Review of Economic Policy*, 31(3–4), pp.279–304.

Harris, S. (2007), 'Public Private Partnerships: Delivering Better Infrastructure Services', *Working Paper*. Washington, DC: Inter-American Development Bank.

International Bank for Reconstruction and Development/World Bank, Asian Development Bank, and Inter-American Development Bank (2014), *Public–Private Partnerships Reference Guide, Version 2.0.* Washington, DC and Manila: World Bank, Asian Development Bank, and Inter-American Development Bank. https://openknowledge.worldbank.org/handle/10986/20118 (accessed 20 February 2019).

Morisugi, H. (2006), 'Privatization of Four Road-Related Public Corporations in Japan', presentation to the workshop on Innovations in Project Delivery and Financing for Surface Transportation Networks, US Transportation Research Board Annual Meeting, 22 January, Washington, DC.

Oi, T. (2012), 'Privatization of Japan's Expressway Company and Its Financing Scheme', paper presented at IBTTA 80th Annual Meeting and Exhibition, 10 September.

Organisation for Economic Co-operation and Development (2015), *Infrastructure Financing Instruments and Incentives*. Paris: OECD. http://www.oecd.org/finance/private-pensions/Infrastructure-Financing-Instruments-and-Incentives.pdf (accessed 20 February 2019).

Ray, S. (2015), 'Infrastructure Finance and Financial Sector Development', *ADBI Working Paper Series*, No. 522. Tokyo: Asian Development Bank Institute.https://www.adb.org/sites/default/files/publication/159842/adbi-wp522.pdf (accessed 20 February 2019).

United Nations Economic and Social Commission for Asia and the Pacific (2011), *A Guidebook on Public–Private Partnership in Infrastructure*. Bangkok: UNESCAP.

https://www.unescap.org/resources/guidebook-public-private-partnership-infrastructure (accessed 20 February 2019).

United Nations Economic and Social Commission for Asia and the Pacific (2017), *Public–Private Partnerships for Cross-Border Infrastructure Development*. Bangkok: UNESCAP.https://www.unescap.org/resources/public-private-partnerships-cross-border-infrastructure-development (accessed 20 February 2019).

Weber, B. and H.W. Alfen (2010), *Infrastructure as an Asset Class: Investment Strategy, Project Finance and PPP.* Chichester, United Kingdom: John Wiley and Sons, Ltd.

Weber, B., M. Staub-Bisang, and H.W. Alfen (2016), *Infrastructure as an Asset Class: Investment Strategy, Sustainability, Project Finance and PPP*, 2nd Edition. Chichester, United Kingdom: John Wiley and Sons, Ltd.

World Bank (2007), *Port Reform Toolkit, Second Edition. Module 5: Financial Implications of Port Reform.* Washington, DC: World Bank. https://ppiaf.org/sites/ppiaf.org/files/documents/toolkits/Portoolkit/Toolkit/pdf/modules/05_TOOLKIT_Module5.pdf (accessed 20 February 2019).

World Economic Forum (2013), *Strategic Infrastructure Steps to Prepare and Accelerate Public–Private Partnerships.* Cologny, Switzerland: World Economic Forum.https://www.weforum.org/reports/strategic-infrastructure-steps-prepare-and-accelerate-public-private-partnerships (accessed 20 February 2019).

Yescombe, E.R. (2007), *Public–Private Partnerships: Principles of Policy and Finance*. Oxford, United Kingdom: Butterworth–Heinemann.

Zen, F. and M. Regan, eds. (2014), *ASEAN Public Private Partnership Guidelines*. Jakarta: Economic Research Institute for ASEAN and East Asia (ERIA).http://www.eria.org/publications/asean-ppp-guidelines/ (accessed 20 February 2019).

Appendix

Table 7A.1: Project's Estimated Cash Flows in Case 1 – Equal Interest Rates for Both Host Governments

($ million)

Item	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Investment (cash outflow)	3,000	1,000	-	-	-	-	-	-	-	-	-	-
Equity	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	2,890	3,736	3,589	3,449	3,317	3,191	3,071	2,958	2,850	2,747	2,650	2,558
Revenue (cash inflow)												
Toll collection	-	-	280	300	321	343	367	393	420	450	481	515
Parking fee	-	-	120	128	137	147	157	168	180	193	206	221
Property management	-	-	280	300	321	343	367	393	420	450	481	515
Total revenue	-	-	680	728	779	833	891	954	1,020	1,092	1,168	1,250
Operation and maintenance costs	-	-	(160)	(171)	(183)	(196)	(210)	(224)	(240)	(257)	(275)	(294)
Operating cash flow	(3,000)	(1,000)	520	556	595	637	682	729	780	835	893	956
Total debt												
Interest	146	224	237	223	207	187	164	137	107	71	35	4
Debt payments	-	-	520	556	595	637	682	729	780	687	501	55
Debt balance (principal)	3,146	4,370	4,087	3,754	3,366	2,916	2,399	1,807	1,133	517	51	-
Debt–equity ratio	1.09	1.17	1.14	1.09	1.01	0.91	0.78	0.61	0.40	0.19	0.02	-
ADSCR	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.22	1.78	17.37
NPV DCR	-	-	0.12	0.26	0.45	0.69	1.06	1.70	3.19	8.05	91.74	-

Table 7A.1: Project's Estimated Cash Flows in Case 1 – Equal Interest Rates for Both Host Governments (continued)

($ million)

Items	Year												
	13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Investment (cash outflow)	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	2,470	2,386	2,307	2,232	2,160	2,092	2,027	1,966	1,908	1,852	1,800	1,750	1,702
Revenue (cash inflow)													
Toll collection	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Parking fee	236	253	270	289	309	331	354	379	406	434	464	497	532
Property management	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Total revenue	1,338	1,431	1,531	1,639	1,753	1,876	2,007	2,148	2,298	2,459	2,631	2,816	3,013
Operation and maintenance costs	(315)	(337)	(360)	(386)	(413)	(441)	(472)	(505)	(541)	(579)	(619)	(662)	(709)
Operating cash flow	1,023	1,095	1,171	1,253	1,341	1,435	1,535	1,643	1,758	1,881	2,012	2,153	2,304
Total debt													
Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt payments	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt balance (principal)	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt–equity ratio	-	-	-	-	-	-	-	-	-	-	-	-	-
ADSCR	-	-	-	-	-	-	-	-	-	-	-	-	-
NPV DCR	-	-	-	-	-	-	-	-	-	-	-	-	-

( ) = negative, ADSCR = annual debt service coverage ratio, NPV DCR = net present value debt coverage ratio.
Source: Author's calculation.

Table 7A.2: Project's Estimated Cash Flows in Scenario I – Interest Rate Increased by 3% from 7% During Construction

($ million)

Item	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Investment (cash outflow)	3,000	1,000										
Equity	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	1,000
Equity after depreciation	2,890	3,736	3,589	3,449	3,317	3,191	3,071	2,958	2,850	2,747	2,650	2,558
Revenue (cash inflow)												
Toll collection	-	-	280	300	321	343	367	393	420	450	481	515
Parking fee	-	-	120	128	137	147	157	168	180	193	206	221
Property management	-	-	280	300	321	343	367	393	420	450	481	515
Total revenue	-	-	680	728	779	833	891	954	1,020	1,092	1,168	1,250
Operation and maintenance costs	-	-	(160)	(171)	(183)	(196)	(210)	(224)	(240)	(257)	(275)	(294)
Operating cash flow	(3,000)	(1,000)	520	556	595	637	682	729	780	835	893	956
Total debt												
Interest	176	289	313	304	291	275	255	231	202	166	129	94
Debt payments	-	-	520	556	595	637	682	729	780	687	501	478
Debt balance (principal)	3,176	4,465	4,258	4,006	3,702	3,340	2,914	2,416	1,837	1,316	945	561
Debt–equity ratio	1.10	1.20	1.19	1.16	1.12	1.05	0.95	0.82	0.64	0.48	0.36	0.22
ADSCR	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.22	1.78	2.00
NPV DCR	-	-	0.11	0.24	0.39	0.58	0.84	1.21	1.86	2.97	4.65	8.71

Table 7A.2: Project's Estimated Cash Flows in Scenario I – Interest Rate Increased by 3% from 7% During Construction (continued)

($ million)

Item	Year												
	13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Investment (cash outflow)	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	2,470	2,386	2,307	2,232	2,160	2,092	2,027	1,966	1,908	1,852	1,800	1,750	1,702
Revenue (cash inflow)													
Toll collection	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Parking fee	236	253	270	289	309	331	354	379	406	434	464	497	532
Property management	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Total revenue	1,338	1,431	1,531	1,639	1,753	1,876	2,007	2,148	2,298	2,459	2,631	2,816	3,013
Operation and maintenance costs	(315)	(337)	(360)	(386)	(413)	(441)	(472)	(505)	(541)	(579)	(619)	(662)	(709)
Operating cash flow	1,023	1,095	1,171	1,253	1,341	1,435	1,535	1,643	1,758	1,881	2,012	2,153	2,304
Total debt													
Interest	56	11	-	-	-	-	-	-	-	-	-	-	-
Debt payments	511	116	-	-	-	-	-	-	-	-	-	-	-
Debt balance (principal)	106	-	-	-	-	-	-	-	-	-	-	-	-
Debt–equity ratio	0.04	-	-	-	-	-	-	-	-	-	-	-	-
ADSCR	2.00	9.41	-	-	-	-	-	-	-	-	-	-	-
NPV DCR	50.84	-	-	-	-	-	-	-	-	-	-	-	-

( ) = negative, ADSCR = annual debt service coverage ratio, NPV DCR = net present value debt coverage ratio.
Source: Author's calculation.

Table 7A.3: Project's Estimated Cash Flows in Scenarios II – Growth Rate of Users Dropped from 7% to 1%

($ million)

Item	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Investment (cash outflow)	3,000	1,000										
Equity	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	1,000
Equity after depreciation	2,890	3,736	3,589	3,449	3,317	3,191	3,071	2,958	2,850	2,747	2,650	2,558
Revenue (cash inflow)												
Toll collection	-	-	280	283	286	288	291	294	297	300	303	306
Parking fee	-	-	120	121	122	124	125	126	127	129	130	131
Property management	-	-	280	283	286	288	291	294	297	300	303	306
Total revenue	-	-	680	687	694	701	708	715	722	729	736	744
Operation and maintenance costs	-	-	(160)	(162)	(163)	(165)	(166)	(168)	(170)	(172)	(173)	(175)
Operating cash flow	(3,000)	(1,000)	520	525	530	536	541	547	552	558	563	569
Total debt												
Interest	146	224	237	223	209	192	175	157	137	116	93	68
Debt payments	-	-	520	525	530	536	541	547	552	558	563	413
Debt balance (principal)	3,146	4,370	4,087	3,786	3,464	3,120	2,755	2,365	1,950	1,508	1,038	693
Debt–equity ratio	1.09	1.17	1.14	1.10	1.04	0.98	0.90	0.80	0.68	0.55	0.39	0.27
ADSCR	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.38
NPV DCR	-	-	0.12	0.26	0.41	0.59	0.82	1.13	1.56	2.27	3.63	5.92

Table 7A.3: Project's Estimated Cash Flows in Scenarios II – Growth Rate of Users Dropped from 7% to 1% (continued)

($ million)

Item	Year												
	13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Investment (cash outflow)	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	617	2,470	2,386	2,307	2,232	2,160	2,092	2,027	1,966	1,908	1,852	1,800	1,750
Revenue (cash inflow)													
Toll collection	309	312	316	319	322	325	328	332	335	338	342	345	349
Parking fee	133	134	135	137	138	139	141	142	144	145	146	148	149
Property management	309	312	316	319	322	325	328	332	335	338	342	345	349
Total revenue	751	759	766	774	782	789	797	805	813	822	830	838	846
Operation and maintenance costs	(177)	(179)	(180)	(182)	(184)	(186)	(188)	(189)	(191)	(193)	(195)	(197)	(199)
Operating cash flow	574	580	586	592	598	604	610	616	622	628	634	641	647
Total debt													
Interest	47	26	8	-	-	-	-	-	-	-	-	-	-
Debt payments	364	290	120	-	-	-	-	-	-	-	-	-	-
Debt balance (principal)	376	112	-	-	-	-	-	-	-	-	-	-	-
Debt–equity ratio	0.15	0.05	-	-	-	-	-	-	-	-	-	-	-
ADSCR	1.58	2.00	4.90	-	-	-	-	-	-	-	-	-	-
NPV DCR	11.78	42.34	-	-	-	-	-	-	-	-	-	-	-

( ) = negative, ADSCR = annual debt service coverage ratio, NPV DCR = net present value debt coverage ratio.
Source: Author's calculation.

Table 7A.4: Project's Estimated Cash Flows in Case 2 – Most Likely Condition

($ million)

Item	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Investment (cash outflow)	3,000	1,000	-	-	-	-	-	-	-	-	-	-
Equity	3,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	2,890	3,736	3,589	3,449	3,317	3,191	3,071	2,958	2,850	2,747	2,650	2,558
Revenue (cash inflow)												
Toll collection	-	-	280	300	321	343	367	393	420	450	481	515
Parking fee	-	-	120	128	137	147	157	168	180	193	206	221
Property management	-	-	280	300	321	343	367	393	420	450	481	515
Total revenue	-	-	680	728	779	833	891	954	1,020	1,092	1,168	1,250
Operation and maintenance costs	-	-	(160)	(171)	(183)	(196)	(210)	(224)	(240)	(257)	(275)	(294)
Operating cash flow	(3,000)	(1,000)	520	556	595	637	682	729	780	835	893	956
Total debt												
Interest	143	217	230	216	199	179	156	130	99	64	29	1
Debt payments	-	-	520	556	595	637	682	729	780	687	464	11
Debt balance (principal)	3,143	4,360	4,070	3,729	3,332	2,874	2,349	1,749	1,068	445	10	-
Debt–equity ratio	1.09	1.17	1.13	1.08	1.00	0.90	0.76	0.59	0.37	0.16	0.004	-
ADSCR	-	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.22	1.93	85.50
NPV DCR	-	-	0.12	0.27	0.45	0.71	1.09	1.77	3.40	9.41	455.13	-

Table 7A.4: Project's Estimated Cash Flows in Case 2 – Most Likely Condition (continued)

($ million)

Item	Year												
	13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Investment (cash outflow)	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Equity after depreciation	2,470	2,386	2,307	2,232	2,160	2,092	2,027	1,966	1,908	1,852	1,800	1,750	1,702
Revenue (cash inflow)													
Toll collection	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Parking fee	236	253	270	289	309	331	354	379	406	434	464	497	532
Property management	551	589	631	675	722	773	827	884	946	1,013	1,084	1,159	1,241
Total revenue	1,338	1,431	1,531	1,639	1,753	1,876	2,007	2,148	2,298	2,459	2,631	2,816	3,013
Operation and maintenance costs	(315)	(337)	(360)	(386)	(413)	(441)	(472)	(505)	(541)	(579)	(619)	(662)	(709)
Operating cash flow	1,023	1,095	1,171	1,253	1,341	1,435	1,535	1,643	1,758	1,881	2,012	2,153	2,304
Total debt													
Interest	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt payments	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt balance (principal)	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt–equity ratio	-	-	-	-	-	-	-	-	-	-	-	-	-
ADSCR	-	-	-	-	-	-	-	-	-	-	-	-	-
NPV DCR	-	-	-	-	-	-	-	-	-	-	-	-	-

( ) = negative, ADSCR = annual debt service coverage ratio, NPV DCR = net present value debt coverage ratio.
Source: Author's calculation.

Chapter 8
Conclusion

Masahito Ambashi

In this report, we have discussed not only what economic impacts the Vientiane–Hanoi Expressway (VHE) could have on Lao PDR, Viet Nam, and Thailand, but also how these countries could maximise economic benefits and promote industrial development strategies toward building a Bangkok–Vientiane–Hanoi industrial corridor by making better use of the VHE.

Meanwhile, this report has some limitations in that it does not draw an explicit conclusion as to whether this expressway should be constructed. This report does not suggest the financial resources (e.g., tax, government bond, foreign aid) for expressway construction and operation taking into consideration financial conditions of individual countries, nor the rate of burden sharing of costs among Lao PDR, Viet Nam, and neighbouring countries. In these points, this report differs from JICA's report, which conducts a comprehensive analysis of the VHE, including economic, environmental, and financial topics. But assuming that the VHE will be advanced in future, this report has provided useful analyses of its construction mechanism and necessary industrial policies to accelerate economic development in the region.

This report concludes with policy recommendations as follows in accordance with both multiple and individual countries.

(1) Policy recommendation for multiple countries

- **Establish a specific consultation system among Lao PDR, Viet Nam, and Thailand to work on a detailed study of the VHE.** This system could push forward details regarding intergovernmental and host government agreements, burden sharing of construction and operational costs among the countries, contract design with companies, public-private partnership (PPP) mechanisms, etc.
- **Deepen and expand friendship agreements among relevant cities and provinces to promote discussion of the VHE.** Four provinces in Thailand (Nakhon Phanom, Sakhon Nakong, Nong Khai, and Bueng Kan), two in Lao PDR (Bolikhamxay and Khammouang), and three in Viet Nam (Nghe

An, Ha Tinh, and Quang Binh) meet twice a year to discuss trade, investment, education, and tourism.

- **Harmonise transport-related policies in coordination among the relevant countries.** Such harmonisation would be realised through implementing the Greater Mekong Subregion Economic Cooperation Program, the Master Plan for ASEAN Connectivity, and the Asia-Pacific Economic Cooperation Framework on Connectivity.
- **Reduce cross-border transport costs such as non-tariff measures.** Various surveys show that logistics costs of Lao PDR and Viet Nam are still higher than those of developed countries. If the Lao PDR and Viet Nam custom authorities charge cross-border forwarders the same kind of fees, transport operators may be discouraged. Unnecessary non-tariff measures should be eliminated from cross-border trade.

(2) Policy recommendation for Lao PDR

- **Improve the quality of construction materials and the capacity of local companies to meet the demands of large-scale construction projects.** The capacity of local companies to support major construction projects remains low, preventing them from benefiting from such projects.
- **Improve soft infrastructure and institutional arrangements to reduce time and cost of custom clearance and quarantine.** They should be more closely aligned with the committed international, regional, and bilateral transport agreements, particularly the Greater Mekong Subregion Cross-Border Transport Facilitation Agreement.
- **Establish an inland container depot in Vientiane as a logistics hub in the Mekong region.** The inland container depot would reduce 'load-on-one-side' containers between Laem Chabang Port and Vientiane. If the VHE is developed, containers could be transported to Hai Phong or Lach Huyen Port, improving the situation.
- **Promote planting vegetables and fruits in mountainous areas.** The difference in elevation makes it possible to produce various agricultural products, including high-value-added subtropical vegetables and fruits, which would attract foreign direct investment in Pak San.

(3) Policy recommendation for Viet Nam

- **Implement effectively the international economic integration process.** Accelerating the negotiation of important free trade agreements (e.g., Regional Comprehensive Economic Partnership) can help realise development opportunities for the country.
- **Design a network of secondary road links to help connect the local districts with the VHE.** The development of road links connecting with the VHE is necessary to utilise the economic opportunities arising from economic integration and foster the economic inclusion of business and social groups.
- **Explore the fiscal space to finance certain components of the VHE project.** Since the country faces tight budget constraints given the enormous demand for public investment, the PPP model, with the involvement of Vietnamese contractors, should be considered.

(4) Policy recommendation for Thailand

- **Conduct necessary investments in the economic corridor.** The industrial development strategies (e.g., the Eastern Economic Corridor project, the Kanchanaburi Special Economic Zone) and infrastructure development (e.g., the 5th Mekong River Crossing Bridge project, double-track railways, motorways) would be prioritised investment targets to reduce inequality in geographical distribution.
- **Redesign logistics in relation to Lao PDR and Viet Nam to increase trade flows.** The economic impact of the VHE on Thailand depends on industrial promotion in Lao PDR and Viet Nam. Increased trade flows are likely to positively affect Thailand.
- **Develop a modal shift strategy to reduce costs and provide service advantage.** It is important to reduce logistics costs and thereby enhance industrial competitiveness of the country.