Chapter 2

A Geographical Simulation Analysis of Impacts of Vientiane–Hanoi Expressway

Souknilanh Keola and Satoru Kumagai

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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?

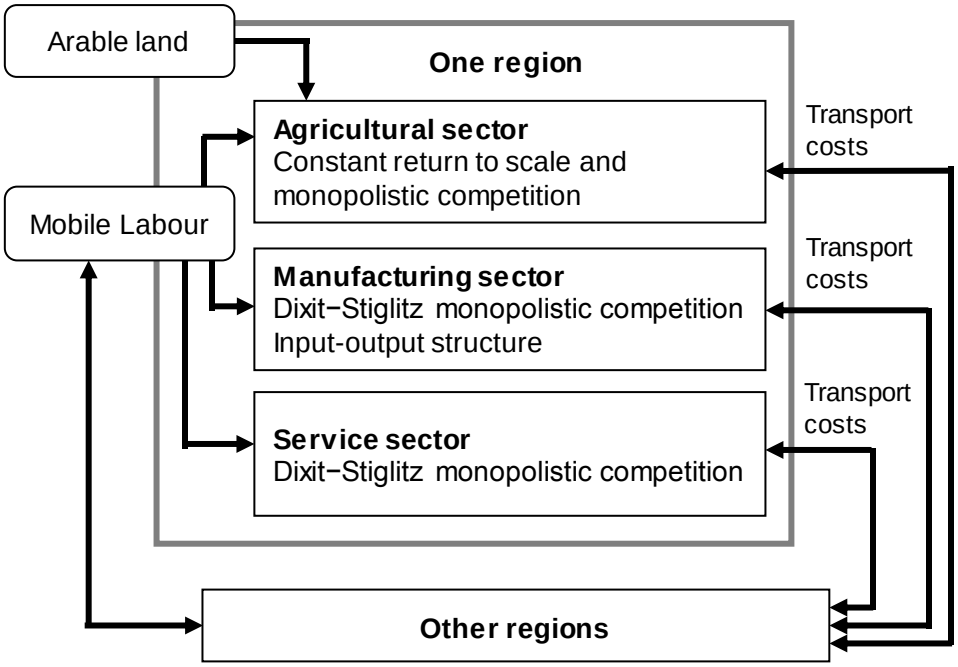
Since 2007, IDE–Japan External Trade Organization (JETRO) has been developing IDE–GSM. The theoretical foundation of the IDE/ERIA–GSM, which is co-developed with ERIA, follows 'New Economic Geography', in particular, Puga and Venables (1996), who captured the characteristics of multi-sector and country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

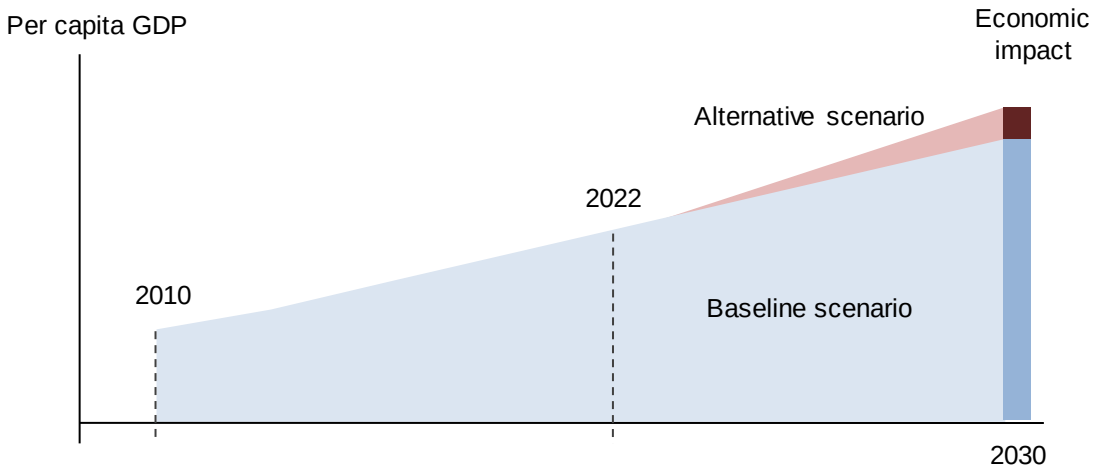


Source: IDE/ERIA–GSM Team.

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

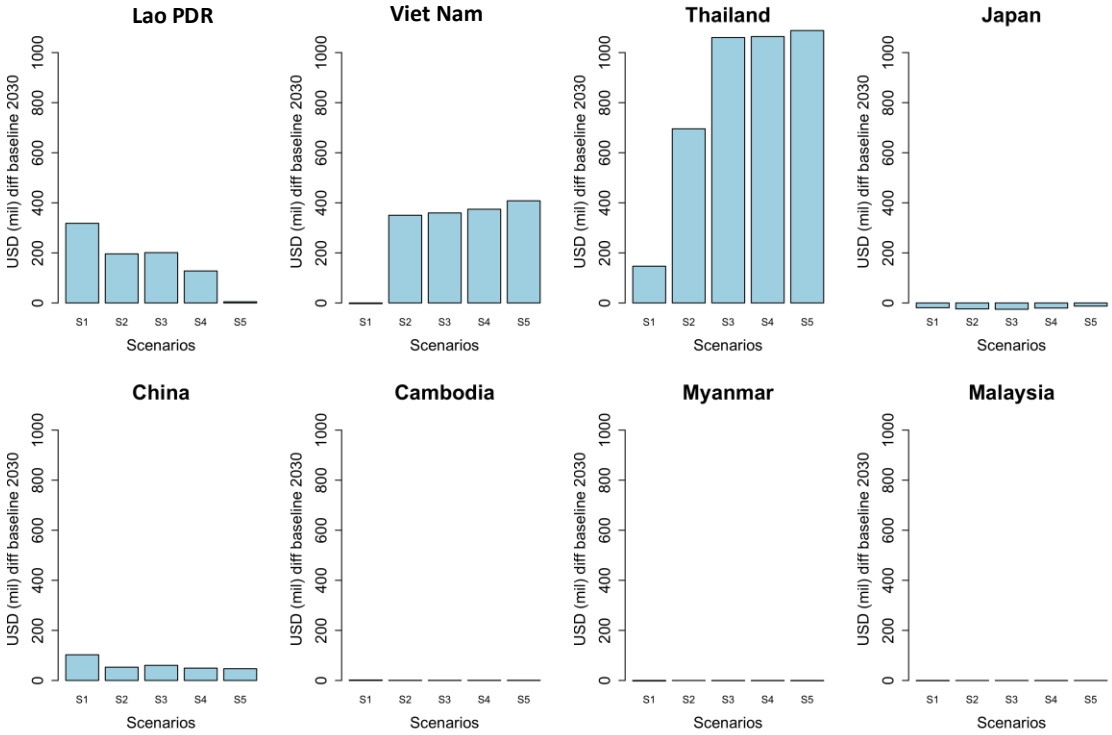
In this scenario, the Lao PDR section of VHE is assumed to be the NR8. We also assume Thailand and Viet Nam would link NR8 with their nearest respective expressways. This is to ensure that we consider the impacts of alternative expressway routes in Lao PDR properly. The VHE is obviously planned as a 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

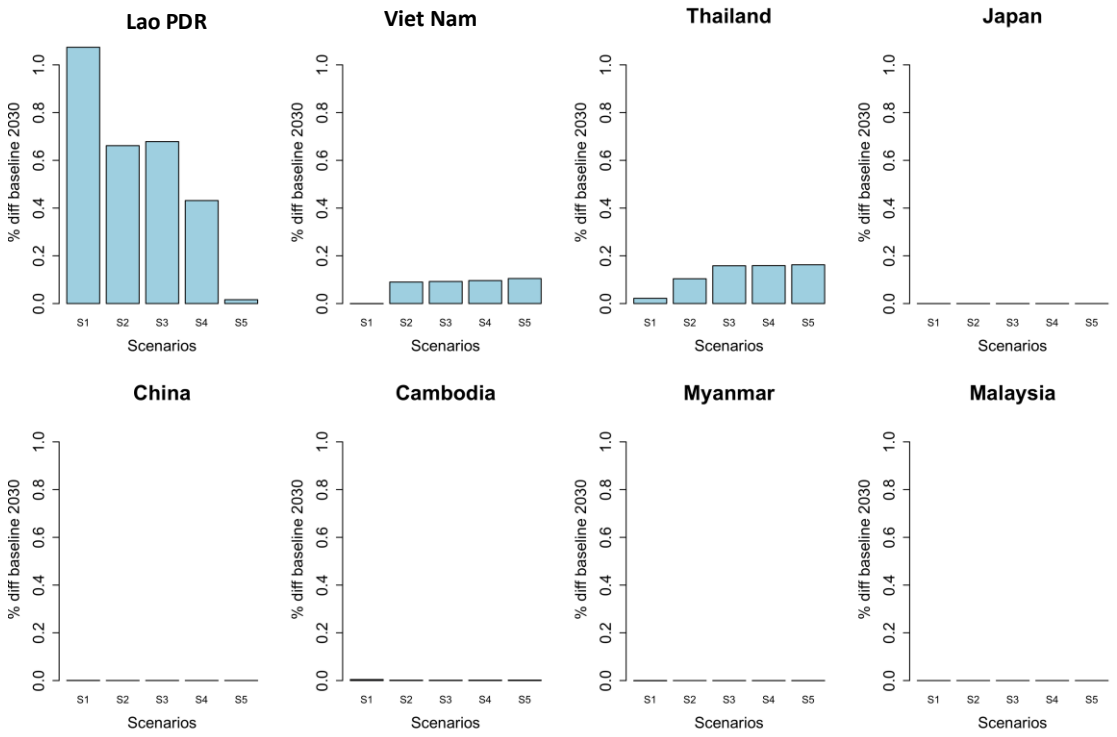
In this scenario, the overall gain for Lao PDR shrink substantially. It would still be a plus, but a very small one. However, the gain for Viet Nam and Thailand slightly increases. The results up to this point yield two interesting insights. First, the location of the expressway does not affect the benefit 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.

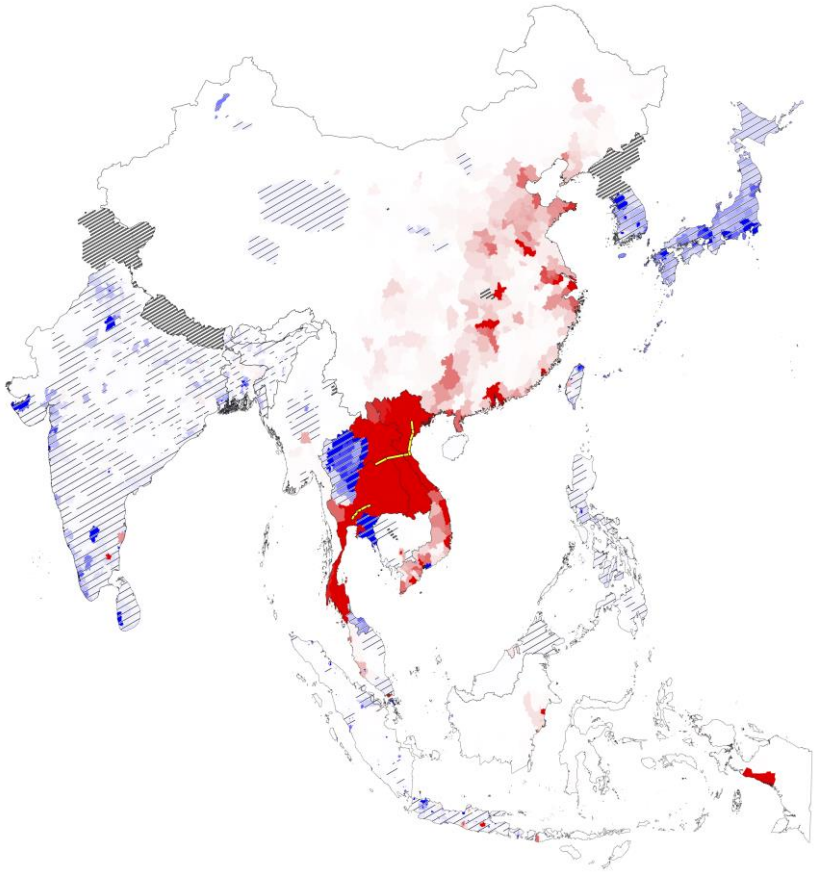
4.3. By Sub-National Regions

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

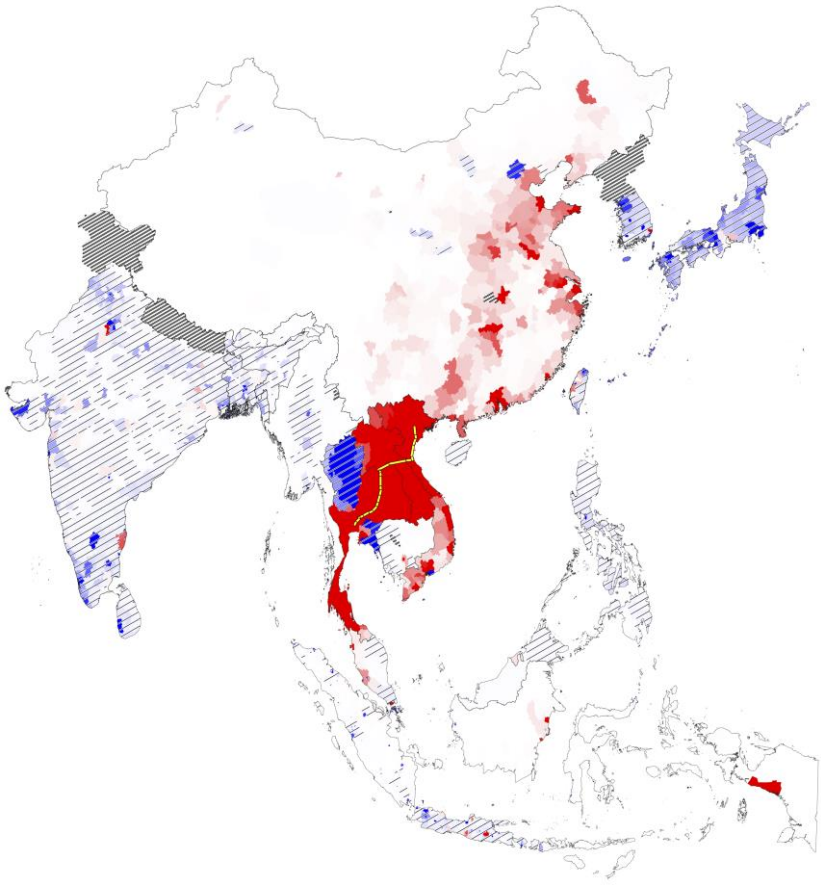


Source: IDE/ERIA–GSM Team.

(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.

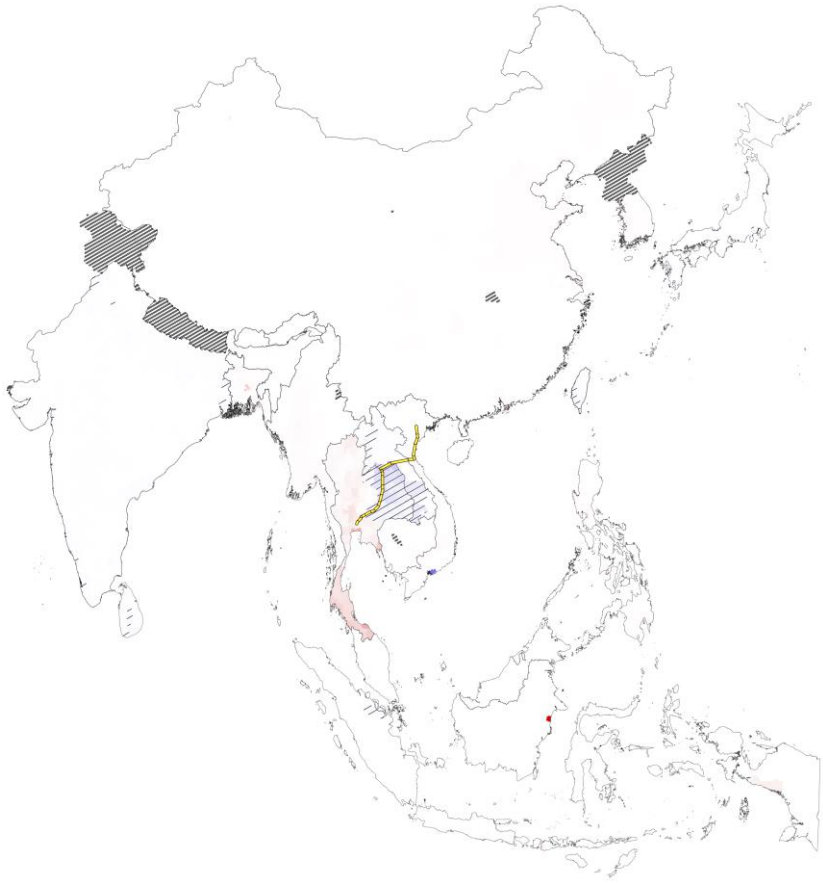
Figure 2.5: Overall Impacts of S4 on Sub-National Regions



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.

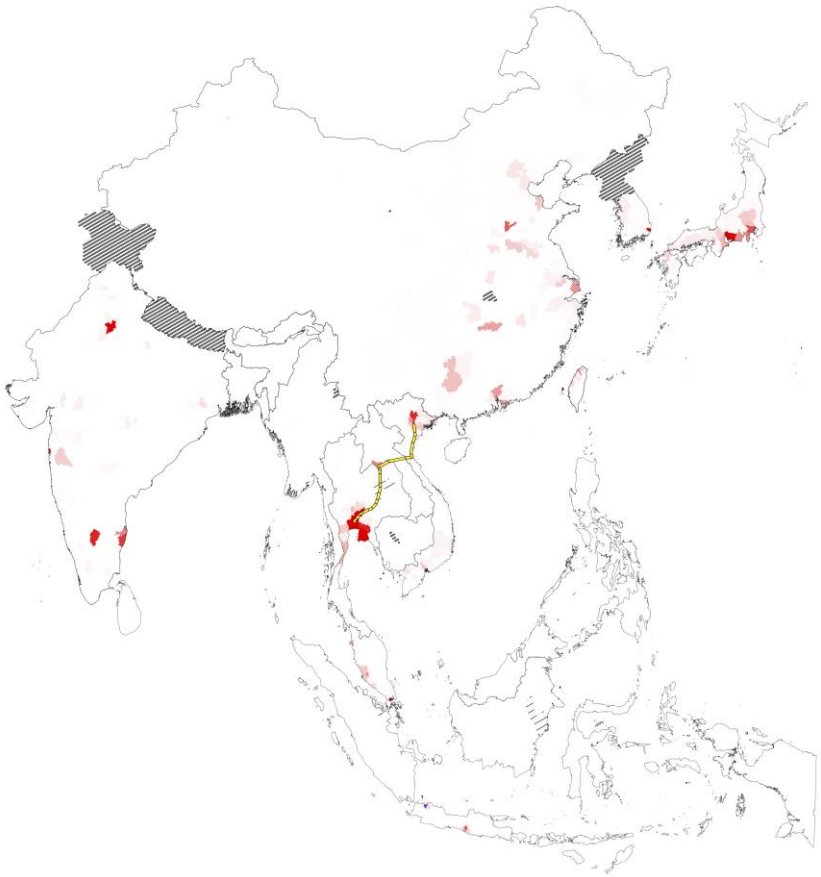
Figure 2.6: Impacts on Agriculture by Sub-National Regions (S3)



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.

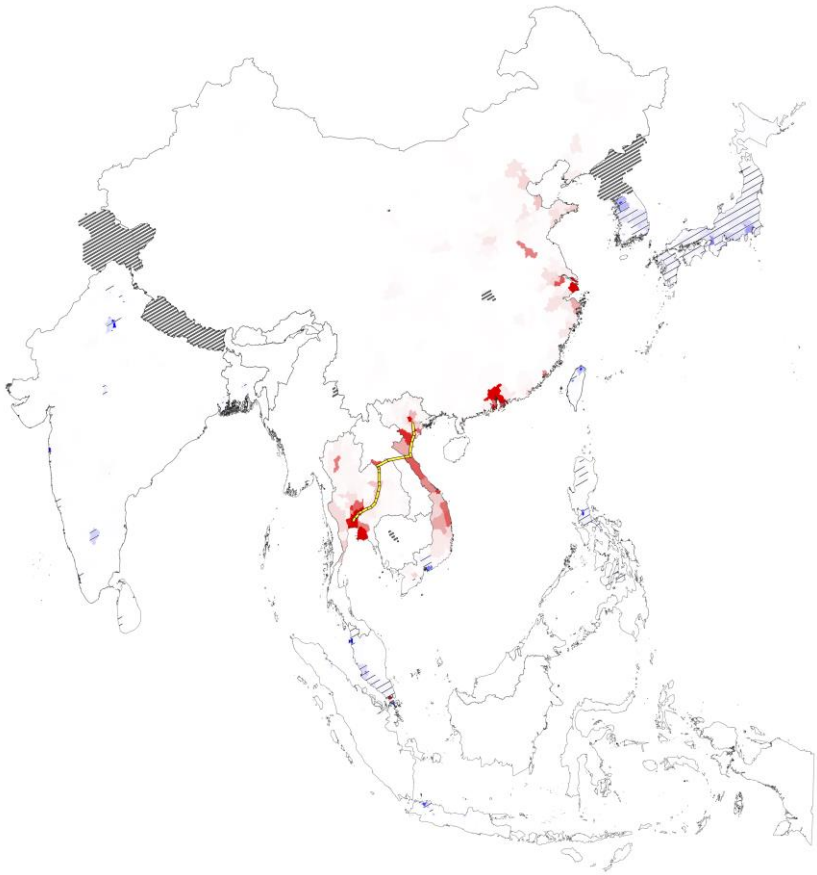
Figure 2.7: Impacts on Automotive Industry by Sub-National Regions (S3)



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.

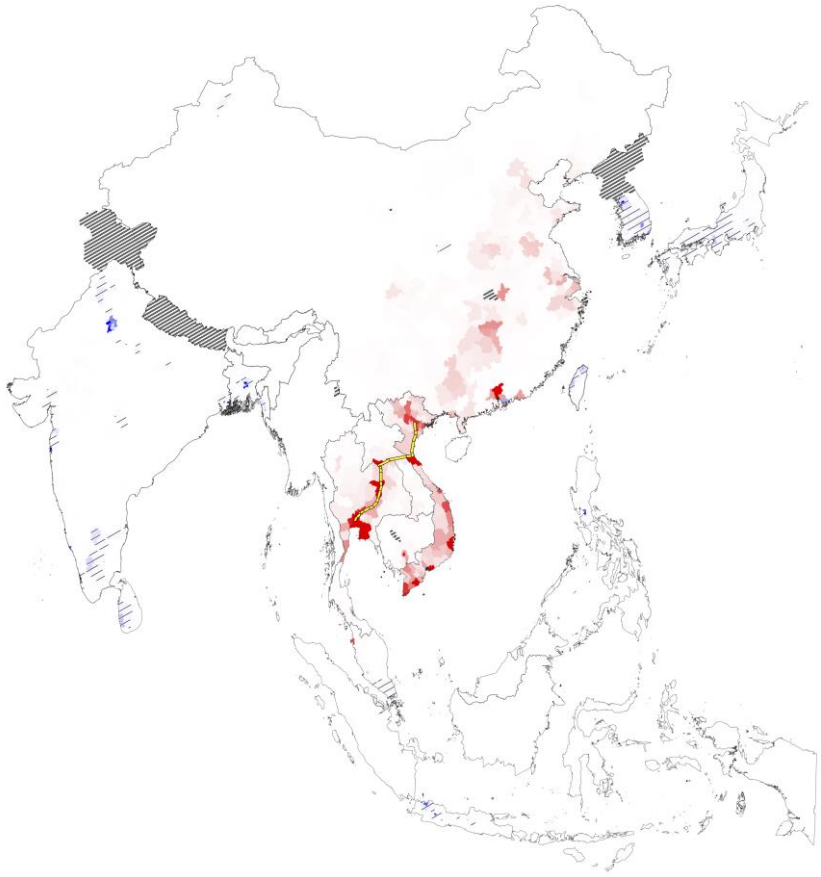
Figure 2.8: Impacts on Electric and Electronic Industry by Sub-National Regions (S3)



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).

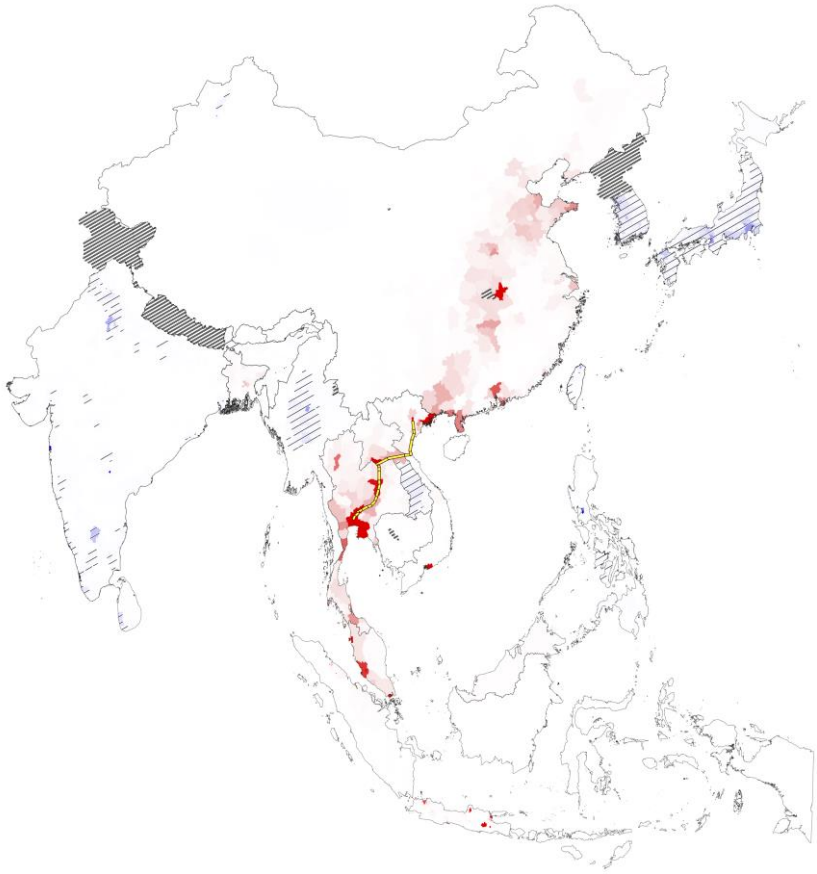
Figure 2.9: Impacts on the Apparel Industry by Sub-National Regions (S3)



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.

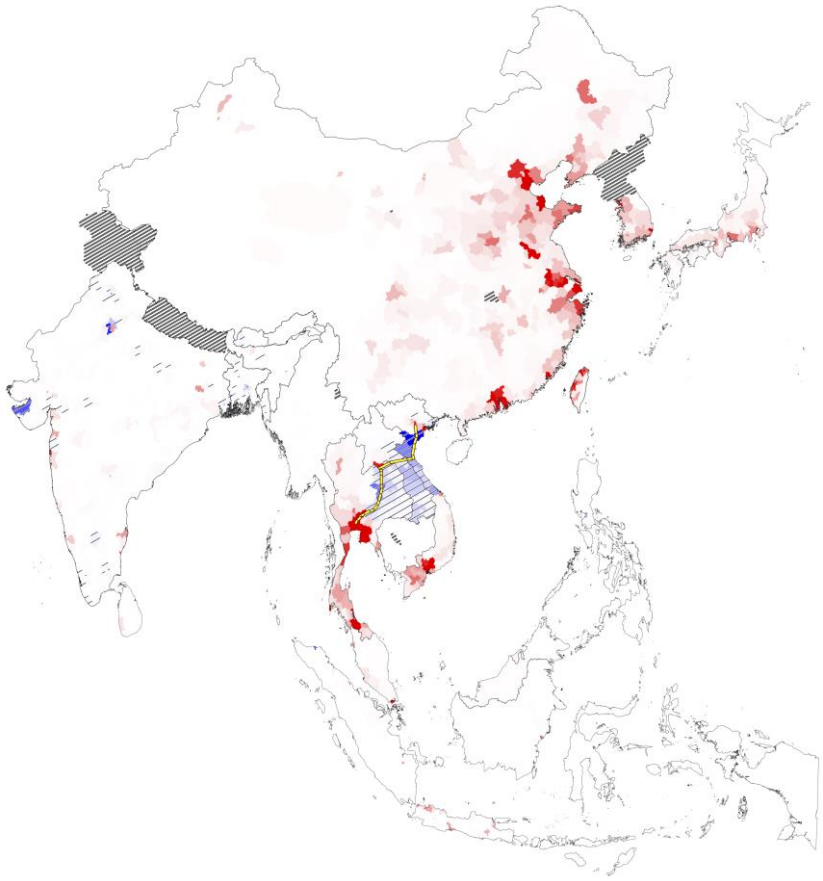
Figure 2.10: Impacts on Food Industry by Sub-National Regions (S3)



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.

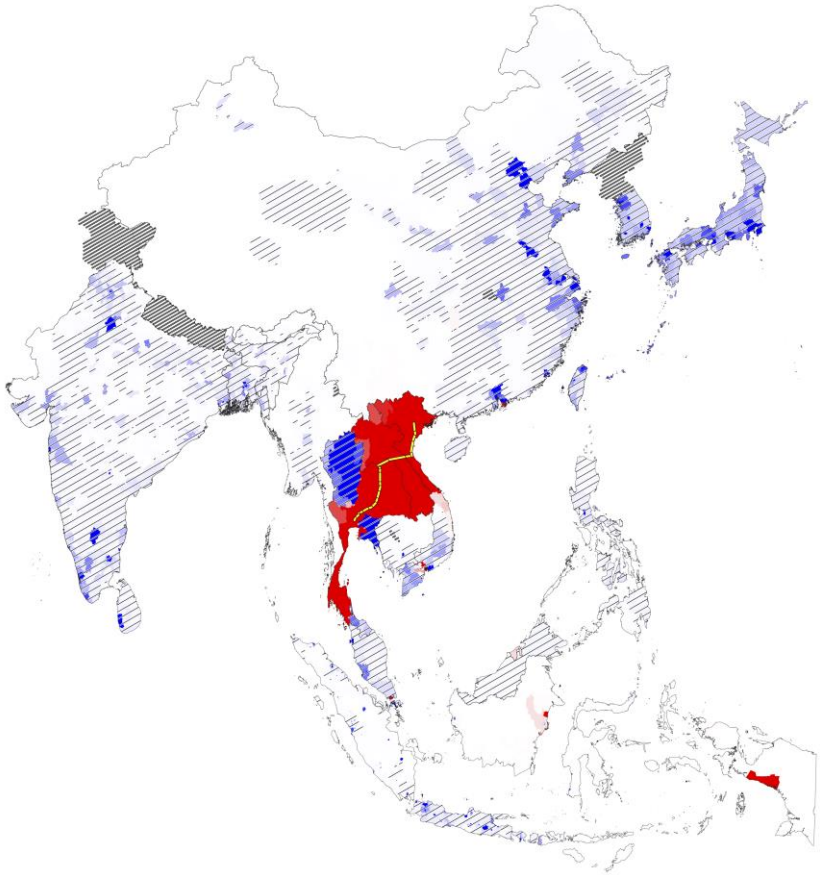
Figure 2.11: Impacts on Other Manufacturing Industry by Sub-National Regions (S3)



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.

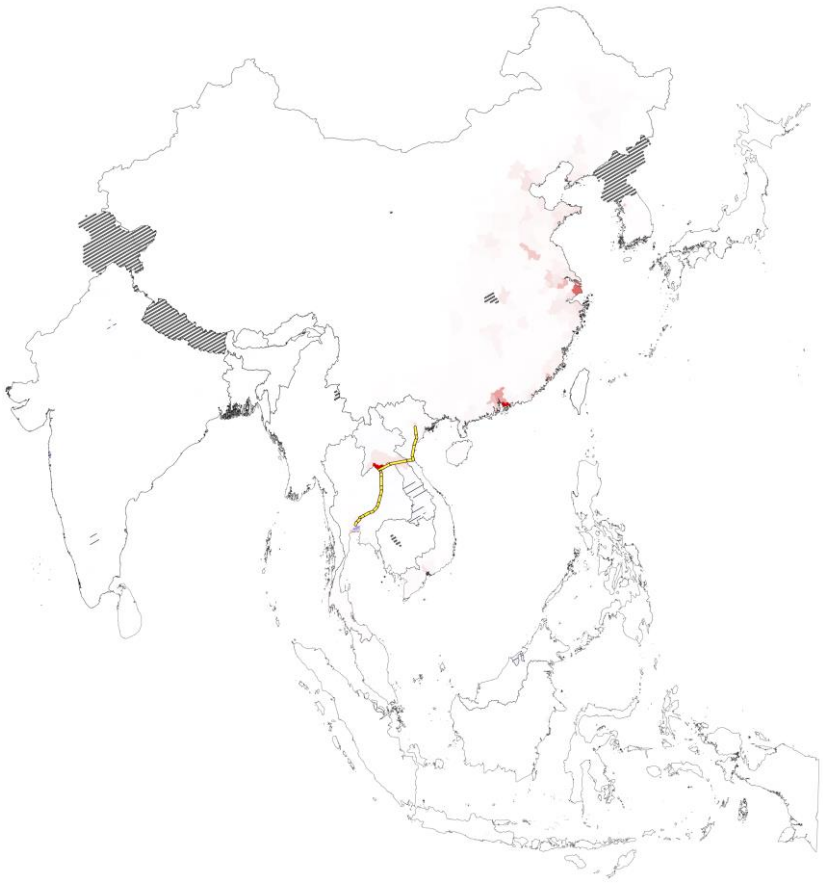
Figure 2.12: Impacts on Services by Sub-National Regions (S3)



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)

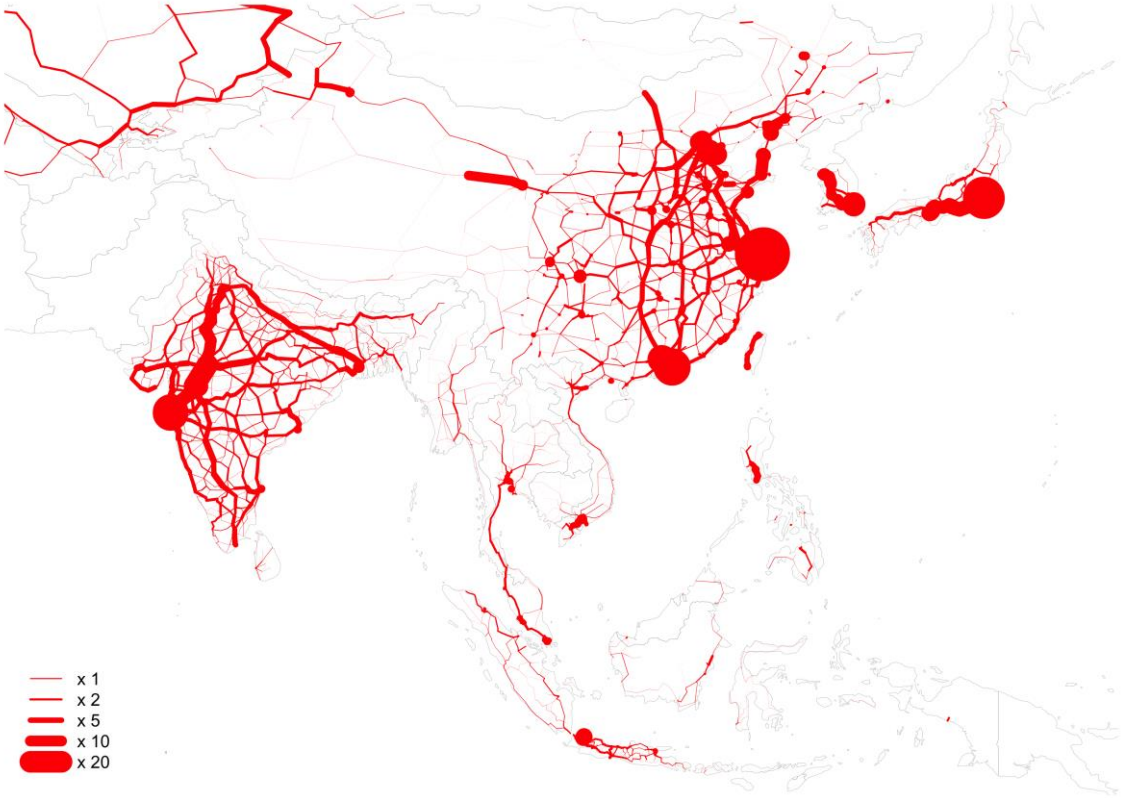


Source: IDE/ERIA–GSM Team.

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.

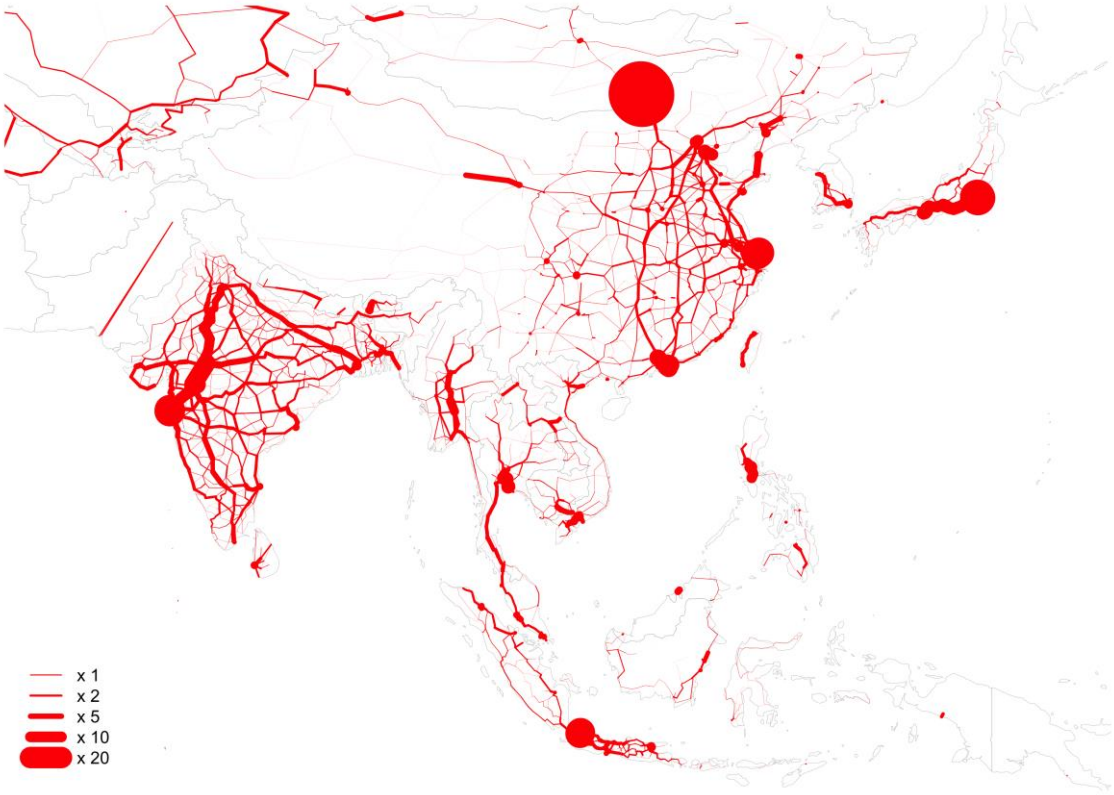
Figure 2.14: Predicted Relative Traffic Volume (vs. World Average) for S3



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.

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