

▶ Chapter 6

Wide-Ranging Transport Infrastructure Development within the ASEAN Region

— Multilayered development, high hopes for economic spillover effect

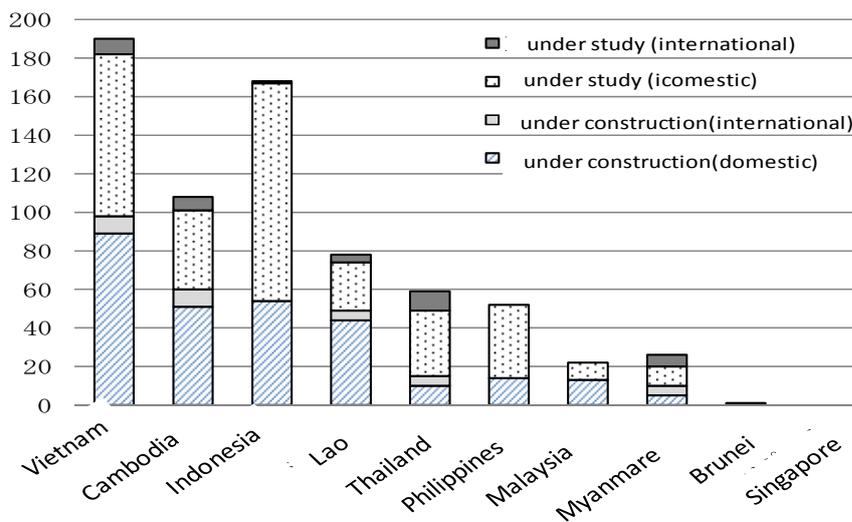
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【Key Points】

- The original ASEAN Member States and Vietnam have achieved high competitiveness through the development of infrastructure from major economic cities to gateway ports or gateway airports. Meanwhile, Cambodia, Laos, Myanmar, and rural areas of the original ASEAN Member States still have problems with vulnerable infrastructure.
- The development of infrastructure is carried out on multiple levels: the ASEAN level, subregional, bilateral, and country-by-country. Among the ASEAN Member States, Indonesia and Vietnam have many projects planned. Among these projects, Vietnam has a relatively high number of projects that have progressed to more than the “construction stage.” Companies have also started to use land transportation in the Greater Mekong Subregion.
- According to the geographical simulation analysis, if transportation infrastructure developed in the ASEAN region, not only would it bring positive spillover effect to the region, but also to outside the region such as Japan, China, South Korea, and India. The transportation routes within the ASEAN region that are expected to have the greatest effects are Thailand-Cambodia-Vietnam and Thailand-Myanmar.

Progress on Transport Infrastructure Development by Country



Note: International projects that connect multiple countries are counted on a country-basis as well.

Source: Created by the author based on ERIA Comprehensive Asia Development Plan Follow-Up Database.

1. Foreword

ASEAN is attracting a lot of attention as a player in the “workshop of the world” and as a market that has been rapidly growing in recent years. Particularly in the Mekong Subregion, there have been many movements that could change the relationship of economic dependency. These movements include the establishment of the ASEAN Economic Community by 2015, the Thailand +1 strategy, and the political reforms in Myanmar. This chapter will examine the current situation of the transportation infrastructure, changes that could be seen in 2015 or post-2015, and the impacts of the development of the region-wide transportation infrastructure.

Vietnam, Indonesia, and the Philippines (sometimes referred to as the VIP countries) still have serious problems with infrastructure in rural areas. The picture in figure 1 vividly illustrates this problem. The location shown in the picture is the most difficult point to travel between Myawaddy and Kawkareik (both are in Myanmar) on the East-West Economic Corridor. The Myawaddy-Kawkareik road is part of a major land transportation route that connects Bangkok and Yangon and is used to transport household goods from the Thailand side to the Myanmar side. Although it is a major route, the mountainous region between Myawaddy and Kawkareik has vehicles run each way on alternate days, East from West on one day and West from East the next day. Since many of Myanmar’s trucks and passenger vehicles are old, a single vehicle breakdown could block the road for all cars traveling between this section. This part of the road has been a bottleneck, interfering with the smooth transportation between Bangkok and Yangon.

**Figure 1: Myawaddy-Kawkareik Section on the East-West Economic Corridor
(Myanmar, 2013)**



Source: Photographed by the author.

2. The development of ASEAN-wide infrastructure

2.1 Multilevel development of infrastructure

A characteristic of the development of ASEAN's infrastructure is that there have been projects on multiple levels, such as projects that were intra-regional, subregional, bilateral, and country-by-country. Intra-regional refers to the development of soft and hard infrastructure led by ASEAN. Subregional refers to initiatives that are smaller than ASEAN. For instance, the Greater Mekong Subregion (GMS), the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT), and the Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) are all subregional projects. Bilateral refers to projects between countries that share a land border, mainly Thailand-Laos and Laos-Vietnam.

The Comprehensive Asia Development Plan (CADP) formulated by the Economic Research Institute for ASEAN and East Asia (ERIA) in 2010 is one example of an attempt to cover these projects in a comprehensive and strategic manner. The CADP listed 695 projects for ASEAN and its surrounding area. Furthermore, the CADP categorized projects into three categories: Top Priority, Priority, and Normal according to the level of importance and urgency, and called to the ASEAN Member States and to the donors for the need to strategically prioritize the development of infrastructure.

When comparing the number of domestic projects that are completed within the country and the number of international projects that connect multiple countries, the number of domestic projects is much larger. When planning new projects on an ASEAN level or a subregional level, it is essential to take into consideration the fact that projects that connect places within a country are still very important to many of the Member States.

2.2 ASEAN projects

On the ASEAN level, ASEAN Member States have designated transport projects¹ that are laid out in various plans such as the ASEAN Economic Community Blueprint, the Master Plan on ASEAN Connectivity (MPAC) that was endorsed in 2010, and the ASEAN Strategic Transport Plan (ASTP).

In terms of arterial roads, the ASEAN ministers designated projects for the ASEAN Highway and the transit transport routes. Specifically, the completion of the missing links and the upgrade of low-standard roads of the ASEAN Highway Network is listed as the first priority project in the MPAC.

With regard to the Singapore-Kunming Rail Link, the MPAC states that the construction of the missing links should be completed by 2020. In terms of hard transportation infrastructure, MPAC includes the study on the roll-on/roll-off (RoRo) shipping network and although JICA has completed the feasibility study, the actual use of the RoRo network is not included in the goals by 2015.

In terms of soft infrastructure, the priority projects of the MPAC are the full implementation of the Member States' respective National Single Windows (NSWs), the development and implementation of mutual recognition arrangements (MRAs), the establishment of common rules for standards and conformity assessment procedures, phased reduction of investment impediments, and the operationalization of the ASEAN Agreements on transport facilitation.

An important point here is that even in projects such as arterial roads or the Singapore-Kunming Rail Link, the individual section of the domestic hard infrastructure would be a project that each country is responsible for and the section that connects two countries could also be counted as a bilateral project. For instance, the completion of the missing links and the upgrade of the low standard roads of the ASEAN Highway Network listed in the MPAC are mostly located in Myanmar and Laos, which reflects the capacity gap between countries.

There are more benefits to ASEAN integration than just the completion of hard infrastructure. The implementation of standardized mutual recognition, common rules for

¹ A comprehensive review by Kasuga (2013) is available in Japanese.

standards, and the ASEAN Agreements on transport facilitation (specifically, the ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAFGIT), which connects more than three countries) are the real benefits. However, progress on the development of soft infrastructure has generally been slow.

2.3 Subregional projects

Subregions such as the GMS, IMT-GT, and the BIMP-EAGA are also drawing and promoting various projects.

In the GMS, an economic corridor is being planned and the GMS Cross-Border Transport Facilitation Agreement (CBTA) is also being promoted. The three economic corridors – the East-West Economic Corridor, the North-South Economic Corridor, and the Southern Economic Corridor – are established as names. For example, the Second Thai-Lao Friendship Bridge over the Mekong River was constructed with high priority with the help of JICA at the end of 2006 in the East-West Economic Corridor. Another deliverable in the GMS CBTA is to improve the implementation of a single-stop inspection mechanism, which allows border control authorities of two countries to jointly conduct one-stop inspections at inbound checkpoints. This will allow cargo trucks traveling between three countries to group the rules, export procedures of the export country, and the imports procedure of the import country into a single inspection. Parts of the single-stop inspection mechanism are already being carried out. As stated in Umezaki (2014), the East-West Economic Corridor has been evaluated as a success.

In the BIMP-EAGA, air-transport liberalization was implemented before ASEAN implemented those measures. This generated many air routes that connect local cities, particularly on the Borneo Island (Kalimantan).

2.4 Bilateral projects

ASEAN also carries out a number of bilateral projects. One example is the Third Thai-Lao Friendship Bridge over the Mekong River that links Nakhon Phanom Province in Thailand with Thakhek in Laos. In accordance with an agreement between the Thai government and the Lao government, the project was funded unilaterally by the Thai government and Italian-Thai Development PCL, a general contracting company in Thailand, was contracted to carry out the construction of the bridge. The bridge was completed in 2011. Meanwhile, the construction of the Fourth Thai-Lao Friendship Bridge that connects the Chiang Khong District in Thailand with Ban Houayxay in Laos was jointly funded by Thailand and China and the construction was also carried out by Thai and Chinese companies. The bridge was completed in 2013.

Currently, there are many bilateral projects in Myanmar. One such project is funded by the Thai government to build a bypass that secures two lanes in the section between Myawaddy and Kawkareik. Another project, which is supported by the Thai government, is to construct a new bridge at the border to link Myawaddy and Mae Sot District in Thailand, and to allow large trucks to pass. The restoring of the bridge that links the section between the Moreh/Tamu border to Kalewa in Myanmar on the Asian Highway or the ASEAN Highway 1 is planned to be financed by India.

2.5 Projects by countries

Many of the projects are domestic projects. In Myanmar, the development of an expressway between Yangon and Mandalay is merely the beginning. After the transition from military rule to civilian rule, Myanmar has been restoring main arterial roads and constructing overpasses within the city limits of Yangon at a rapid pace.

Road maintenance as means to relieve traffic jams in big cities is a particularly pressing issue for each country. Indonesia announced the Master Plan for Acceleration and Expansion of Indonesia's Economic Development (MP3EI) in 2011. An important part of this plan is to identify and develop six domestic economic corridors in a comprehensive and strategic manner. The Metropolitan Priority Area (MPA) for Investment and Industry in the Greater Jakarta Area was also established. The objectives of this plan are the construction of the Jakarta Mass Rapid Transit (MRT) and the new Cilamaya Port.

According to the simulation analysis by the author (Isono & Kumagai, 2012), the construction of the new Cilamaya Port would bring a huge economic benefit to Indonesia by relieving traffic jams on the Jakarta-Cikampek Toll Road. The current situation forces people to travel through the center of Jakarta to go to Tanjung Priok Port from the industrial estates concentrated along the Jakarta-Cikampek Toll Road. Therefore, constructing the new port east of the industrial estates would not only would it relieve traffic jams on the Jakarta-Cikampek Toll Road but also relieve further congestion in Jakarta city to a certain extent. According to the simulation, if the construction of both the Cilamaya Port and the bypass (to the Tanjung Priok Port) of the Jakarta-Cikampek Toll Road were to be pushed back from 2020 to 2030, it would cause an average loss of \$8.57 billion annually to Indonesia's economy.

2.6 Impact of the development of infrastructure

What kind of impact would the infrastructure development, particularly the infrastructure development that links two countries, have? The trade value by trade across land borders that links Thailand and Laos shows that from 2003 to 2013, trade across land

borders drastically increased. In general, exports from Thailand to Laos have been growing about three times more compared to imports for a period of time; however, imports have recorded a significant growth as well.

The borders used for exports and imports vary. For instance, there are two routes used for trade from Thailand to Laos. One route is from Nong Khai to Vientiane via the First Mekong Friendship Bridge, and the second route is from Mukdahan to Savannakhet via the Second Mekong Friendship Bridge in the East-West Economic Corridor. Meanwhile, the primary route used for trade from Laos to Thailand is the route from Savannakhet to Mukdahan using the Second Mekong Friendship Bridge. One reason for this is that the demand for Thai products is extremely high in Vientiane, a huge consuming region. Therefore, the route from Nong Khai to Vientiane is mainly for the flow of Thai products. Another reason why the Second Mekong Friendship Bridge is used more is because this trade value includes trade in the East-West Economic Corridor, such as trade from Thailand to Vietnam or China, or trade from Vietnam or China to Thailand. Therefore, the Second Mekong Friendship Bridge between Mukdahan and Savannakhet is used for this commerce.

In terms of exports, trade via Mukdahan saw an increase in 2008. They were hit by the Global Financial Crisis in 2009, but they also have seen a rapid increase since 2010. Meanwhile, imports already resulted in a huge growth since 2006. It is likely that this is due to the completion of the Second Mekong Friendship Bridge that opened in 2006.

3. New movements to use infrastructure

3.1 Use of Thailand +1 and Mekong Economic Corridor

In recent years, there have been movements for Thailand +1 – a strategy to move the labor intensive production process from Thailand to a branch plant of neighboring countries that have lower wages, and then return the completed parts to Thailand. In order for this type of strategy to be viable, there needs to be a relatively big wage difference, sufficiently low service link costs (including the transportation cost and the information costs of managing the transportation and the production processes at the branch plant), and no free flow of laborers between countries (ERIA 2010).

Figure 2 shows specific examples of operations that are carried out in the transport route with Mekong region's Bangkok in the center. Black dotted lines indicate borders.

The first example is the route from Bangkok to Hanoi via the Second Mekong Friendship Bridge/East-West Economic Corridor. Compared to the sea transport route that is currently dominant, this land transport route is three to four times more expensive in cost,

but the lead time is reduced to less than half. Therefore, it is attracting attention as an alternative route that is faster than sea transport and cheaper than air transport. In this first example, a Thai container truck departs from Bangkok, crosses the Thai/Laos Border, and arrives in Savannakhet. At a container terminal in Savannakhet, the container is transshipped to a Vietnamese container truck that came from Vietnam. The Vietnamese container truck will cross the Dansavan/Lao Bao border and finally arrive in Hanoi.

The second example is the route from Bangkok to Ho Chi Minh City. Similar to the first example, a Thai container truck crosses the Aranyaprathet/Poipet border and at the container terminal in Poipet, the container is transshipped to a container truck from Cambodia. The Cambodian container truck then crosses the river on a ship in Nak Loeung. At a container terminal in Bavet, the container is transshipped to a Vietnamese container truck. This Vietnamese container truck crosses the Bavet/Moc Bai border and arrives in Ho Chi Minh City.

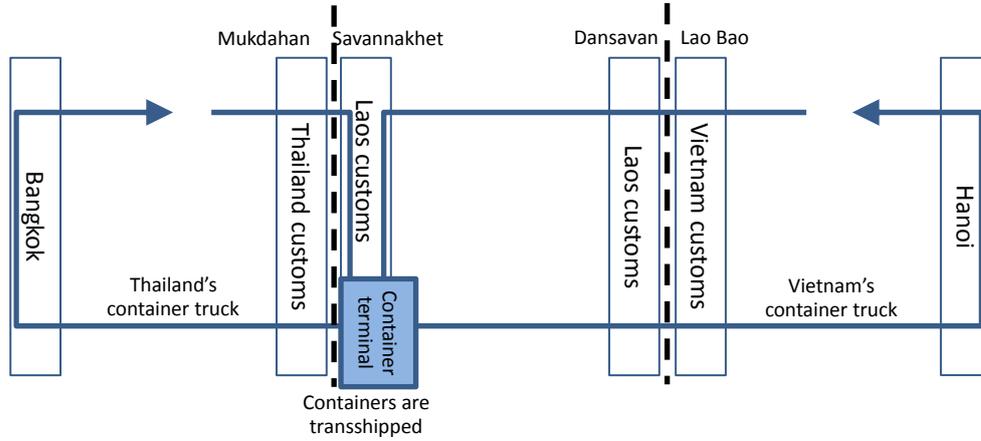
The third example concerns the transport of household goods from Bangkok to Yangon. A Thai container truck that departed from Bangkok transships onto a different Thai six-wheel truck on the road in Mae Sot before crossing the border. This six-wheel truck travels on the bridge that crosses the border of Mae Sot and Myawaddy and at a container terminal in Myawaddy, the container is transshipped to a six-wheel truck from Myanmar. This six-wheel truck from Myanmar travels to Yangon.

Why are there transport changes in these routes? One reason is that certain vehicles cannot travel in some areas. For instance, in the first example, Thai vehicles can travel to Dong Ha in Vietnam,² but cannot travel to Hanoi under the CBTA. On the other hand, Vietnamese vehicles traveling from Hanoi can only travel to Khon Kaen in Thailand. Because of this, as long as Thai and Vietnamese vehicles are used, containers need to be transshipped at some point. As previously mentioned, the Mae Sot/Myawaddy border has a bridge that cannot physically allow the passing of large vehicles due to the problem with the integrity of the bridge. Therefore, containers need to be transshipped onto a smaller six-wheel truck. The second reason for transport changes is the difference between right and left-hand traffic. Rather than having a Thai car that has the steering wheel on the right side drive in Laos, where traffic drives on the right-hand side, it is more convenient for a Vietnamese car that has the steering wheel on the left to drive in Laos. The third reason is that countries decide not to allow cars from other countries to be driven in order to avoid various operational troubles, even if it is institutionally possible.

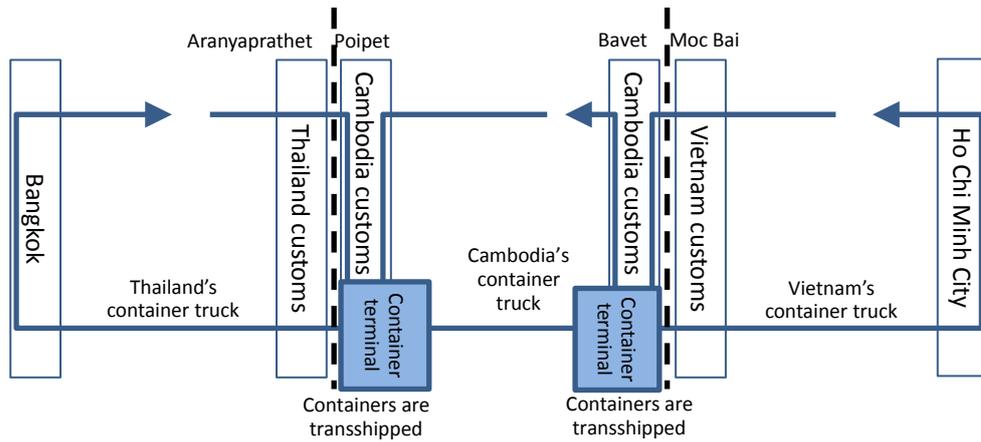
² In reality, Thai vehicles can travel to Da Nang, but on the Bangkok-Hanoi route, it is up to Dong Ha.

Figure 2: Current Situation of Cross-Border Transport

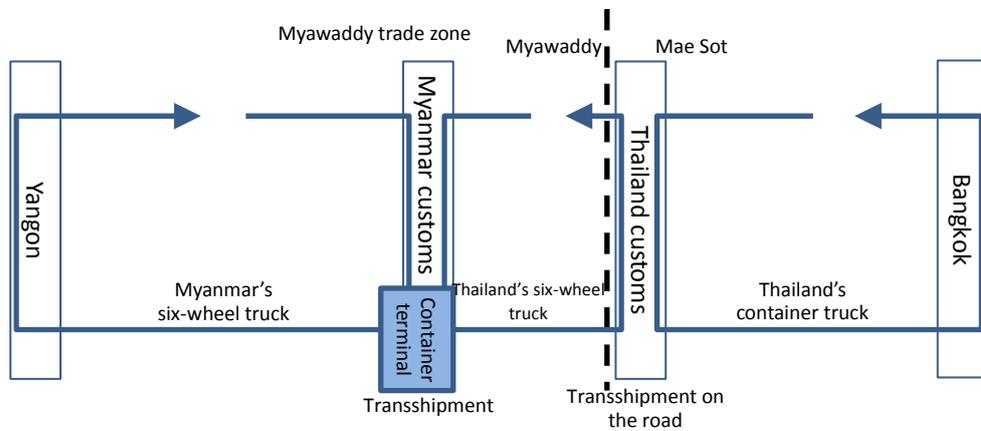
[Bangkok-Laos-Hanoi]



[Bangkok-Cambodia-Ho Chi Minh City]



[Yangon-Bangkok]



Source: Created by author using sources announced by the Nippon Express Company at the JICA Seminar in June 2014.

What kind of improvements could be made with regard to the examples listed in figure 2?

First, Lao vehicles can run on all sections from Bangkok to Hanoi; therefore, if Lao vehicles are used, containers do not have to be transshipped all the way from Bangkok to Hanoi. In reality, there are logistics providers who are working on transport between the three countries using Lao vehicles. Furthermore, in 2013, since the range of the CBTA, which covers the East-West Economic Corridor, was agreed to be expanded from Bangkok's Laem Chabang Port to Hanoi's Haiphong Port, the use of these regions will also be anticipated.

There are also cases in Cambodia in which Thai vehicles travel all the way from Bangkok to Phnom Penh. Once the transport operations in Cambodia move smoothly, it would be possible to transship a container from a Thai vehicle to a Vietnamese vehicle in Cambodia and decrease one time of transshipping from figure 2.

The section between Bangkok and Yangon can be improved immensely. If the new bridge between Mae Sot and Myawaddy opens, then there is no need to transship containers on the road of Mae Sot. Additionally, if the bypass between Myawaddy and Kawkaeik is completed, the section between Myawaddy and Yangon will also be available for container trucks.

With regard to the connection between transport facilitation and Thailand +1, Thai vehicles already travel directly to the plants in Vientiane and Savannakhet in Laos. Similar cases can be seen in Phnom Penh. In these cities, people will easily be able to engage in commerce due to border facilitation under the CBTA in the East-West Economic Corridor and the Southern Economic Corridor.

In Myanmar, Thai vehicles can travel to Myawaddy, which is in the same East-West Economic Corridor. But since Burmese people can move relatively easily from Myawaddy to Thailand, wages are pulled toward Mae Sot in Thailand. Because of this, wages are high in Myawaddy compared to other cities in Myanmar. This has led investors to think that there is no reason to build plants in Myawaddy. Meanwhile, some investors and experts consider Hpa-An, a city located away from the Myawaddy- Kawkaeik section, to be promising. This is because wages in Hpa-An – which is over the mountains are not as rapidly rising as they are in Myawaddy. It is necessary for a few institutional changes to happen for commerce to flow smoothly. For instance, the new bridge between Mae Sot and Myawaddy needs to open, the bypass between Myawaddy and Kawkaeik needs to be completed, and Thai trucks should be able to directly travel to Hpa-An.

4. Geographical simulation analysis

4.1 What is a geographical simulation model?

This section will examine how the development of transport infrastructure in ASEAN will make an impact on each ASEAN Member State using the geographical simulation model (GSM). The GSM is one of the spatial computable general equilibrium models that are continuing to be vigorously developed by leaders in international trade, regional science, and urban economics. The GSM can graphically show how industries cluster and disperse, and how economic activities change because of the development of infrastructure.

The GSM has its unique economic model, program, and data set and can give theoretical underpinnings to the decisions in the selection of important infrastructure, prioritization of projects, and the selection of combinations in the CADP. Moreover, the GSM is used in policy recommendation documents such as the MPAC, the ASEAN Strategic Transport Plan (ASTP), the Indonesia Economic Development Corridor (IEDC), and the Myanmar Comprehensive Development Vision (MCDV), which all have the same framework as the CADP.

A significant characteristic of the GSM is that it examines economic development on a subnational level, smaller than a country level. This allows economic effects of road construction, border facilitation, FTAs, and a combination of the above to be analyzed using a single framework. In the simulation model, each company takes into consideration monetary cost and time cost, and selects a mode of transportation such as trucks, ships, air transport, railway, or a combination of modes. In addition to physical infrastructure, the GSM has tariff data and estimates policy and cultural barriers. Policy and cultural barriers cover everything from non-tariff barriers to preferences on food. Companies and people move to regions with higher profits or higher indirect utility from their livelihood and different scenarios produce different industrial distribution.

In the simulation, first, the scenario in which development only partially occurs is used as a baseline. Then, a scenario with development is used. The results of these two simulations are used to calculate the difference in for instance, the GDP (gross domestic product) or the GRDP (gross regional domestic product), which indicate the economic effects.

4.2 Economic effects of improving ASEAN connectivity

In this section, the results of the economic effect analysis of the improvement of ASEAN connectivity will be introduced. The results were based on joint research carried

out by the GSM team at the IDE (including the author of this paper) and the Thammasat University in Thailand. This project discusses what kind of impact the AEC would have on the economies of Thailand and ASEAN countries (and particularly on industrial relocation). This project simulated not only the impact that the development of transportation infrastructure would have, but also the impact that the AEC measures in general would have on ASEAN.

In the baseline scenario, it assumes that the following measures would be completed by 2015: the reduction and elimination of tariffs in the AEC; the Third and the Fourth Mekong Friendship Bridge (which have already been completed); road maintenance in Laos; road maintenance in Myanmar including the Myawaddy-Kawkareik section; the Neak Loeung Bridge over the Mekong River, which is currently being built; and the construction of the Friendship Bridge that connects Pakxan in Laos and Thailand.

The development scenario is noted in the footnote.³ Here, major infrastructure

³ [Thailand]

- NSW completed in 2020.
- Section between Aranyaprathet and Sisophon in Cambodia on the Singapore-Kunming Rail Link completed in 2020.
- Congestion worsens at borders, major ports, and airports along with the increase in traffic in 2020. Additional expansion of infrastructure in 2025, five years after, eases congestion.
- The following items will be implemented in 2025.
 - Road maintenance from Kanchanaburi to Dawei in Myanmar.
 - Road maintenance from Prachuap Khiri Khan to the Myanmar side.
 - Commencement of RoRo route to Phuket and Belawan in Indonesia.
 - Completion of the Pak Bara Port.
 - Completion of the State Railway of Thailand.

[Indonesia, the Philippines, Vietnam, and Brunei]

- Commencement of the RoRo route between General Santos (the Philippines) and Bitung (Indonesia).
- Congestion worsens at borders, major ports, and airports along with the increase in traffic in 2020. Additional expansion of infrastructure in 2025, five years after, eases congestion.
- Completion of NSWs in 2025 (2020 for Brunei).
- Commencement of the RoRo route between Zamboanga (the Philippines) and Muara (Brunei), Johor (Malaysia) and Sintete (Indonesia), Tawau (Malaysia) and Tarakan (Indonesia), Dumai (Indonesia) and Malaka (Malaysia), and Belawan (Indonesia) and Penang (Malaysia).

[Singapore and Malaysia]

- Completion of the Kuala Lumpur-Singapore High Speed Rail in 2025.

(It is assumed that additional infrastructure expansion meets the increase in demand; therefore, there is no assumption that congestion will worsen)

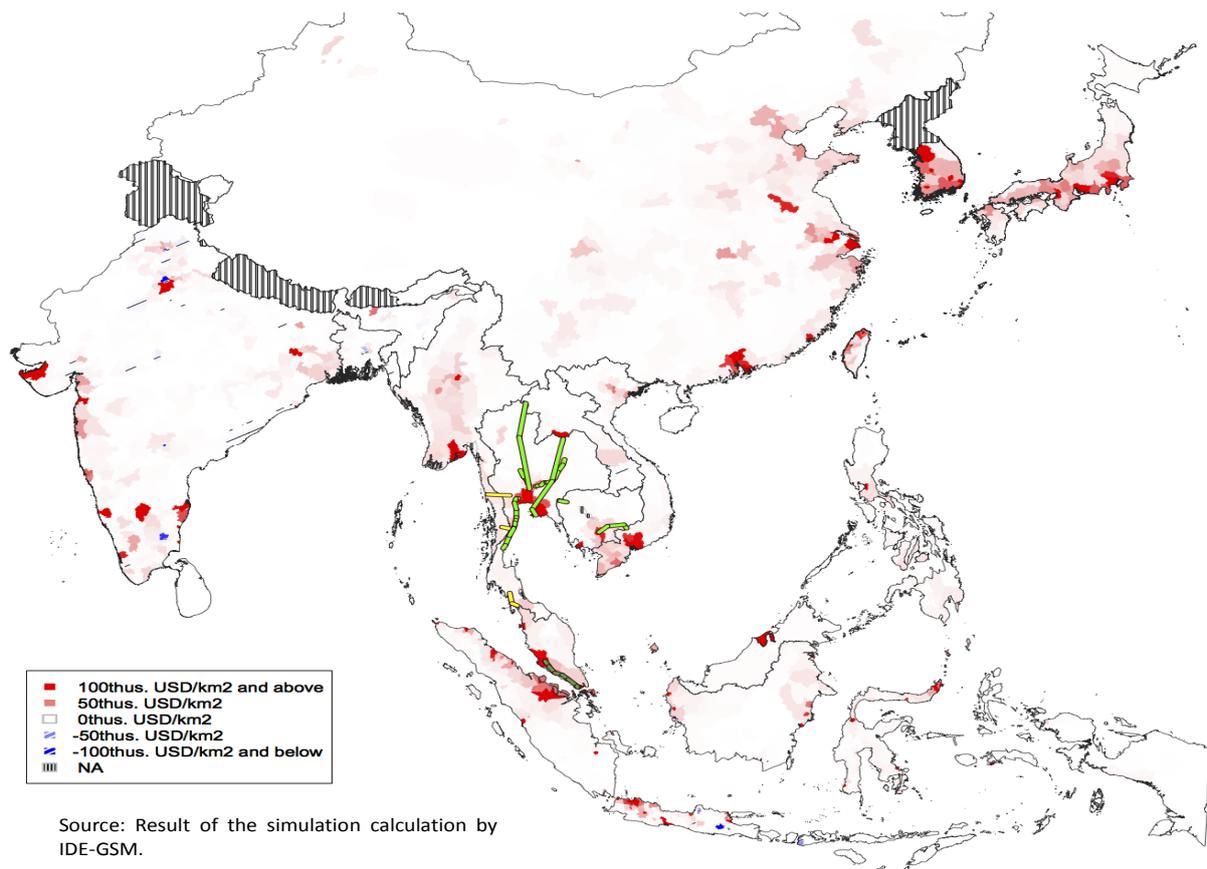
[Cambodia, Laos, and Myanmar]

- Additional reduction of non-tariff barriers from 2015.
- Technological improvement in Phnom Peh and Sihanoukville due to the SEZ in Phnom Peh and Sihanoukville in 2015.
- Technological improvements in Vientiane and Savannakhet due to the SEZ in Vientiane and Savannakhet.
- Congestion worsens at borders, major ports, and airports along with the increase in traffic in 2020. Additional expansion of infrastructure in 2025, five years after, eases congestion.
- Technological improvement in Yangon and Mandalay due to the SEZ in Yangon and Mandalay in

projects of the ASEAN Member States and the expansion of major ports and airports of the ASEAN countries are taken into consideration aside from the projects listed in the MPAC.

Figure 3 shows the economic effects of the development scenario. In this figure, an index called the impact density is used. Impact density is calculated by the value of the economic effect of each region divided by the area of each region. By using this index, it is possible to compare regions or countries with a lot of economic effect. The regions that are darker have a high positive economic effect, while regions with hashed lines result in a negative economic effect. The darkest region will have an economic effect that is more than \$100,000 per 1 square km. The negative economic effect here means that the GRDP in the development scenario is lower than the GRDP in the baseline of 2030. Therefore, it does not mean that the regions would have a negative economic growth from 2014 to 2030.

Figure 3: Economic Effects from the Improvement of ASEAN Connectivity (2030, Impact Density)



2015.

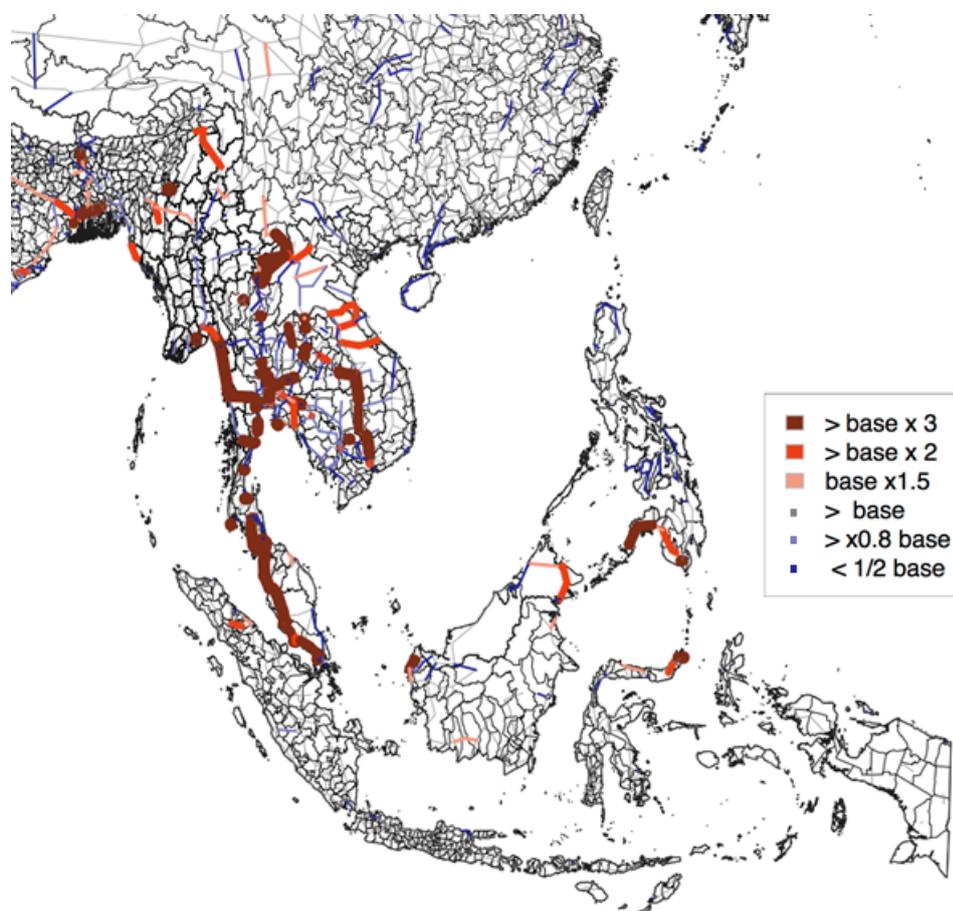
- Completion of NSWs in 2025.
- Section between Phnom Peh and Ho Chi Minh City on the Singapore-Kunming Rail Link completed in 2025.

Impacts on ASEAN by country show that positive economic effect will be concentrated in Bangkok and the surrounding areas, especially in industrial estates including Chonburi and Rayong in Thailand. Vientiane in Laos will also see an extremely positive economic effect. In Cambodia, in addition to Phnom Penh and its surrounding area, Sihanoukville, an entry port, will also have a concentrated positive economic effect. In Vietnam, positive economic effects will concentrate in the industrial estates mainly around Ho Chi Minh City. In Myanmar, two major cities, Yangon and Mandalay, will see positive economic effects. In Malaysia, economic effects will be positive in Kuala Lumpur (and its surrounding areas), Penang, and along the high speed rail that goes to Singapore. In the Philippines, only the Metropolitan Manila area will see a high positive economic effect. In Indonesia, not only Jakarta and its surrounding areas, but also many areas such as Riau and Manado (Bitung) (which are connected by the RoRo) will have concentrated positive economic effects.

Economic effects are not only limited to ASEAN Member States. For instance, in Japan, prefectures in the Tokaido corridor such as Tokyo, Saitama, Kanagawa, Aichi, and Osaka will have high economic effects. In the development scenario, Japan would not develop infrastructure or facilitate trade, but the simulation results imply that through trade with the ASEAN Member States and through the economic growth of the ASEAN Member States, positive economic effects would spillover. This coincides with the idea of integrating ASEAN's economic growth into Japan. Similarly, positive economic effects will be seen with large cities and industrial areas in the center in South Korea, China, and India.

Figure 4 shows the traffic volume in the development scenario. This figure shows changes in traffic volume between the baseline traffic volume and the traffic volume in the development scenario between each land section. Here, the estimate is that a huge growth could be seen in the Mekong region. For instance, the route from the border of Thailand to Singapore via Malaysia, the radial route with Bangkok in the center, the route that goes to China on the North-South Economic Corridor, and the routes that link Thailand and Vietnam such as the Laos National Route 9, 12, and 8 could all see growth.

Figure 4: Change in Traffic Volume due to the Improvement of ASEAN Connectivity



Lastly, with regard to the assumptions of the simulation: the development scenario assumes that the congestion around borders, major ports, and airports will worsen by 2020, but that congestion in those areas will improve by 2050. This is because the simulation assumes that the efforts made by the individual countries and donors would ease congestion over time. If these conditions are not met and congestion worsens, positive economic outcomes will not be achieved. At that point, a new plan and strong leadership in policy will be required to swiftly develop urgent projects.

References

- Umezaki, S. (2014). Myanmar to chiiki kyoryoku. *Posuto gunsei no myanma – tein sein seiken no chukan hyoka* – (T. Kudo, Ed.). Academic Research Repository at the Institute of Developing Economies.
- Kasuga, H. (2013). ASEAN renketsusei no kyoka to kotsu/nyu bunya no kaizen – ASEAN keizai kyodotai ni muketa torikumi no hashira toshite. *ASEAN keizai kyodotai to nihon – kyodai togo shijo no tanjo* (K. Ishikawa, K. Shimizu & S. Sukekawa, Eds.). Chapter 5. Bunshindo Publishing Corporation.
- ASEAN. (2010a). *The Master Plan on ASEAN Connectivity*. Jakarta: ASEAN Secretariat.
- ERIA. (2010). *The Comprehensive Asia Development Plan*. ERIA Research Project Report 2009 No. 7-1, ERIA.
- Isono, I. (2011). Possible Alternative Routes for Further Connectivity in the Mekong Region. *Intra- and Inter-City Connectivity in the Mekong Region* (M. Ishida, Ed.). BRC Research Report No. 6, IDE-JETRO.
- Isono, I., & Kumagai S. (2012). The Proposed Cilamaya New International Port is a Key for Indonesian Economic Development: Geographical Simulation Analysis. *ERIA Policy Brief 2012-05*, ERIA.
- Isono, I., & Kumagai S. (2013). Dawei Revisited: Reaffirmation of the importance of the project in the era of reforms in Myanmar. *ERIA Policy Brief 2013-01*, ERIA.
- Kumagai, S., Isono, I., Hayakawa, K., Keola, S., & Tsubota, K. (2013). Geographical Simulation Analysis for logistics enhancement in Asia. *Economic Modelling*, Vol.34, pp.145-153.