

Chapter 9: Infrastructure Development in Thailand

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Abstract

This report describes Thailand's infrastructure development. It report begins with a discussion on the current status of infrastructure development in Thailand. It then describes the country's infrastructure development plans. Furthermore, three important issues of the infrastructure development are highlighted, namely, modal shift and intermodal transport; cross-border transport agreement for market integration; and infrastructure pricing. Finally, the report provides policy recommendations. First, the government should develop the policy documents to set up the strategies and directions for infrastructure development in each transport sector. Second, it should invest in transport infrastructure, especially intercity motorways and railway improvement. Third, the government should facilitate improvements of law, regulations, and rules that facilitate the management of the transport sector. Among others, it should have a law which specifies that an independent organization could be set up as a regulator for the transport sector. Fourth, the government should enhance the regional integration through cross-border trade. Finally, the government should accelerating the creation of Public Service Agreement.

1. STATUS OF INFRASTRUCTURE DEVELOPMENT IN THAILAND

Table 1 shows an overview of the transport infrastructure in Thailand.

Table 1: Transportation and Logistics-Related Infrastructures: An Overview

| Mode | Details |
|--|---|
| Highways: | <i>Total:</i> 61,586 km <i>Paved:</i> 61,238 km <i>Unpaved:</i> 348 km |
| Railways: | <i>Total:</i> 4,071 km <i>Narrow gauge:</i> 4,071 km 1.000-m gauge |
| Waterways: | 4,000km <i>Note:</i> 3,701 km navigable by boats with drafts up to 0.9 m |
| Merchant marine: | <i>Total:</i> 386 ships (1,000 GRT or over) 2,038,597 GRT/3,104,712 DWT <i>By type:</i> bulk carrier 57, cargo 142, chemical tanker 12, combination ore/oil 1, container 21, liquefied gas 25, passenger 3, passenger/cargo 4, petroleum tanker 89, refrigerated cargo 30, roll on/roll off 1, specialized tanker 1 <i>Foreign-owned:</i> 55 (Indonesia 1, Japan 3, Norway 45, Singapore 6) <i>Registered in other countries:</i> 35 |
| Ports and harbors | <i>(Major ports)</i> <i>Bangkok, Laem Chabang, Map Ta Phut Port, Songkhla, Phuket, Sriracha, Siam Sea Port</i> |
| Airports - with paved runways | <i>Total:</i> 65 <i>Over 3,047 meter:</i> 7 <i>2,438 to 3,047 meter:</i> 10 <i>1,524 to 2,437 meter:</i> 23 <i>914 to 1,523 meter:</i> 19 <i>under 914 meter:</i> 6 |
| Airports - with unpaved runways | <i>Total:</i> 44 <i>1,524 to 2,437 meter:</i> 1 <i>914 to 1,523 meter:</i> 15 <i>under 914 meter:</i> 28 |
| Heliports | 3 |
| Pipelines | Gas 3,112 km; refined products 265 km |

| Mode | Details |
|------------------------------------|--|
| Transport nodes | <i>Truck terminals:</i> 3 public terminals <i>Off-dock container freight stations:</i> 16 stations permitted <i>Inland container depot:</i> 4 ICDs (including 1 publicly owned) <i>Container yards:</i> 21 yards <i>Warehouses:</i> 83 public warehouses <i>Silo:</i> 13 silos <i>Cold storage:</i> 102 storages <i>Bonded warehouse:</i> 146 manufacturing bonded warehouses, 30 general bonded warehouses, 22 duty-free shop bonded warehouses, 3 general bonded warehouses for exhibitions, 1 general bonded warehouse for gasoline storage, 18 dock-yard bonded warehouses, 18 bonded warehouses for free trading activities <i>Industrial estates:</i> 33 locations |
| Logistics service providers | <i>Total:</i> 300 providers |

Source: The “Report on the Study of Potential Transportation Networks and Alternative Linkage Strategies (2006).” Office of Transport and Traffic Policy and Planning.

1.1 Road Transport Infrastructure

1.1.1. Road network and Nodes

Thailand has the necessary basic infrastructure in the form of well-connected roads and highway networks across the country. To boost the road infrastructure, the Thai government is planning to construct 4,150 km of motorways across the country, connecting the east-west and north-south economic corridors.

There are currently a number of nodes that provide multi-modal transfer points for air and sea shipments, which facilitate trade services catering to major products and goods, namely, Truck Terminals, Off-dock Container Freight Station (CFS), Inland Container Depots (ICDs), Container Yards, and Product Storage Areas.

1.1.2. Road connections with neighboring countries

Thailand has an important strategic advantage regarding roadway services, connecting to Myanmar in the north and west, Lao People's Democratic Republic (Lao PDR) in the northeast, Cambodia in the east, and Malaysia in the south. Transportation and logistics from Thailand to southern China is also possible via these neighboring countries, particularly Lao PDR and Myanmar.

The trade routes and border points are generally in good condition. This notwithstanding, the Thai government has endorsed several projects that are aimed at improving the infrastructure of its neighbors along the border areas.

1.1.3. Problems and limitations

Thailand is faced with specific limitations in road transportation on top of other major problems such as high traffic volume, geometry of roadways, lack of parking space for large vehicles, noise, pollution and heavy fuel consumption.

- (1) A truck may not pass between two states and goods must be transferred to another truck that belongs to the neighboring country. This generates extra costs in addition to time wasted and a high possibility that products may be damaged.
- (2) Overloading of trucks may result in high road maintenance costs.
- (3) Laws and regulations relating to logistics and transportation sector have not been enforced strictly up to international standards.

1.2. Railway Freight Transport

1.2.1. Networks and node

Train transportation often lacks fluidity and may have delays when changing locomotives at train stations or nodes. Furthermore, other locomotives do not satisfy logistics demands. Thailand has an estimated 4,180 km of rail tracks that connect 46 provinces.

Thailand has three types of rail tracks at present: single, dual, and triple tracks. Single tracks total 3,901 km (93.3 percent of total railways), while dual and triple tracks constitute 220 km (5.3 percent) and 59 km (1.4 percent), respectively.

1.2.2. Problems and Limitations

Problems and limitations of the railway sector in Thailand can be identified as follows:

- (1) Occurrence of rail accidents mainly due to the lack of signaling equipment at various roads railways junctions.
- (2) Lack of protective equipment in 2,300 areas across the country where roads and railways intersect, most of which have only warning devices.
- (3) Congestion at ICD Lat Krabang – Laem Chabang Port.
- (4) The tracks used in carrying shipments (except for boxed products) between Lat Krabang and Laem Chabang Port are single-track, which often cause delays due to the necessity of switching tracks.
- (5) Insufficient locomotives to meet demands.

1.3. Waterways Transport

1.3.1. Networks and nodes

1. Inland waterway freight transport

Routes in Thailand include the Chao Phraya, Pa Sak, Bang Pakong, Mae Klong and Tha Chin rivers. Inland waterways enable international ships to travel south to Bangkok through the Chao Phraya River, from where they transfer their cargo to smaller carriage ships owing to the limits imposed by the size of the river.

2. International waterway freight transport

The international routes are via the Mekong River, which passes through China, Myanmar, Thailand, Lao PDR, Cambodia and Vietnam.

International freight transport along the Mekong River is mostly related to commerce with southern China, which is using Chiang Saen port in Thailand, and Chiang Rung and Sur Maoh ports in southern China. There is also freight transport between Thailand and Lao PDR through the Chiang Khong Port in Thailand and the Luang Prabang city in Lao PDR.

3. Coastal Network

Sea transport remains the key to Thailand's international trading activities and its volume is increasing on a year-to-year basis.

4. Inland Waterway Transport – Bangkok and Vicinity

Ports along the Chao Phraya River are mostly operated by the private sector. There are 61 ports along both sides of the Chao Phraya River at present, each of which could take cargo ships weighing up to 500 gross tons. These are mainly used for shipping cargo from the Bangkok port to Sichang Island in the Gulf.

Six ports are currently used for transporting containers and authorized as public harbors for international ships. These ports are as follows:

- (a) Two ports along the east bank of the Chao Phraya River
- (b) Four ports along the west bank of the Chao Phraya River

5. International Waterway Port

There are two international waterway ports, namely, Chiang Saen Port and Chiang Khong Port, both located in the Chiang Rai Province. The Chiang Saen Port supports 200 to 300 gross ton ships, and it is usually used for transporting both conventional and container cargo. Chiang Khong Port can support two to three 100 gross ton-ships at the same time and is specifically used for international freight transport.

6. Coastal Network

The main international ports in Thailand that are operated by the government are as follows:

a. Bangkok Port. The port can accommodate ships with an average draught of 8.5 to 11 meters from mean sea level (MSL) but cannot support vessels that are longer than 172 meters, heavier than 12,000 DWT, or have a draught deeper than 8.2 meters from MSL.

b. Laem Chabang Port. It is the largest freight transport port in Thailand and is approximately 14 meters deep from MSL and can support post Panamax vessels containing 5,000 TEUs. The port's link to the port of Seattle in the United States helps reduce cargos handling and checking processes at ports in the United States.

c. Map Ta Phut Port. Located on the coast of Rayong Province, approximately 220 km southeast of Bangkok, this port has a watercourse of 8 to 12.5 meters deep from MSL. This facility is the only transport mode connecting to this port.

d. Songkhla Port. Lying 100 km north of the Thailand-Malaysia border in Songkhla Province, the port has a watercourse of approximately 9 meters deep from MSL; land transport is the only mode connecting to this port. This port cannot, however, support vessels that are longer than 173 meters, heavier than 12,000 DWT, or have an average draught deeper than 7 meters from MSL.

e. Phuket Port. Lying in the southwestern region of Thailand, the port's watercourse measures approximately 9 meters in depth from MSL; land transport is the only transport mode connecting to this port. This port cannot support vessels that are longer than 210 meters, heavier than 20,000 DWT, or a draught deeper than 8.5 meters from water surface.

f. Sriracha Harbor Pier. Located about 122 km southeast of Bangkok, the four-terminal pier can support vessels with a draught of less than 14.5 meters from MSL; the only form of intermodal transport connecting to this port is land transport.

g. Siam Sea Port. Located in Sriracha District, Chon Buri Province, the port can support vessels ranging from 500 to 60,000 DWT, with a draught of 14.5 meters from MSL. This port has 22 warehouses with a total area of 80,000 square meters, 150,000 TEUs ICDs for supporting containers, a 2,600 TEU container field, and 8,300 square meters of CFS warehouse.

1.3.2. Problems and obstacles

1. Water transported goods are subject to various extra costs such as double handling and time costs.
2. Access to most transport routes and networks for inland waterways is seasonal.
3. Four countries in the GMS zone (China, Thailand, Myanmar, and Lao PDR) are increasing navigation capacities by reef explosions in the Mekong River. This adversely affects the ecology of the Mekong River.

1.4. Air Freight Transport

1.4.1. Networks and nodes

Thailand currently has 35 airports and 31 air freight operators. The AOT, a state enterprise under the Ministry of Transport, is responsible for the continual development of international airports.

1.4.2. Problems and Obstacles

- a. Four warehouses under the Airports Authority of Thailand have become highly congested. Moreover goods must be inspected and pass the customs service process before loading on board, which is time consuming.

b. Thai airlines do not have air freighters, which increases freight costs.

c. Refrigerated storage or cool storage space is limited. Thus, exporting a large number of goods could be problematic.

1.5. Pipeline Transport

1.5.1. Networks and nodes

Thappline and FPT are two oil pipeline service providers. The usage of Thappline is approximately 32 percent while FPT provides services at about 36 percent of its capacity. The length of the natural gas pipeline is 1,359 km offshore and 1,031 km onshore.

1.5.2. Problems and limitations

Problem regarding pipeline transport is that the transmission percentage indicates under utilization, implying externalities to road users.

2. INFRASTRUCTURE DEVELOPMENT PLANS

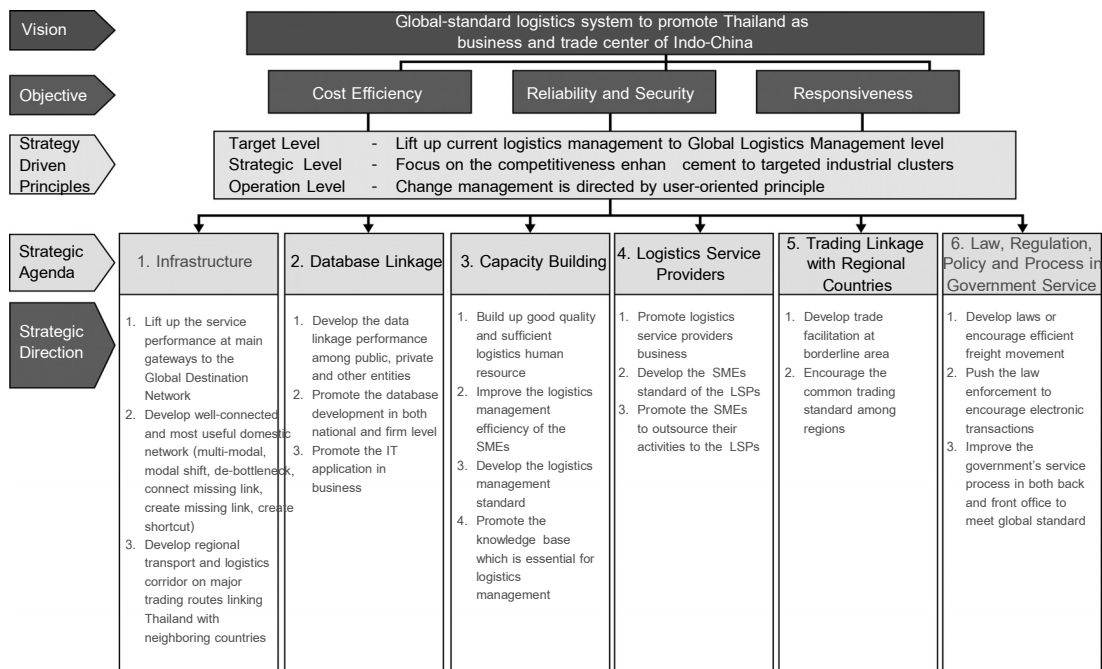
2.1. Approaches to Thailand's logistics system development

To develop the logistics system and obtain concrete results, collaboration is needed at all levels, including the government and private sectors, among other institutions. However, the extent to which the concept of the logistics system is understood varies among different sectors. Therefore, to promote the right concept and for the whole country to work toward a common goal, the Infrastructure Project Office, together with the Competitiveness Development Office and the National Economic and Social Development Board, as the government organizations tasked to enforce the national logistics development strategies, produced in May 2005 a document entitled "Thailand's Logistics Development." The document is designed to supplement "The

National Logistics System Development Master Plan.” It also seeks to promote basic understanding of logistics and of the national strategies for logistics system development currently implemented by the government. It is aimed at all sectors, especially the private sector. It is hoped they will become widely active in logistics system development.

The approaches to Thailand’s logistics system development covers infrastructure, data linkage and database development, personnel and knowledge base, service providers, regional trade linkage, and relevant legislation. The Ministry of Transport has made the Ministry of Transport strategic plan consistent with the logistics master plan by the National Economic and Social Development Board, as shown in Figure 2.

Figure 2: Framework of the Logistics System Development Master Plan



Source: NESDB. Logistics Master Plan during the period 2005-2008 (In Thai): 10.

2.1.1. Logistics Infrastructure

a. Development of major gateways

Laem Chabang Port

The Ministry of Transport has formulated water transport development policies to provide a low-cost transportation alternative that will help turn Laem Chabang into one of the world's top 10 ports.

International Airport

The Ministry of Transport has devised a strategy to develop aerial logistics, which focuses on developing Chiang Mai and Phuket airports as regional gateways, and the Suvarnabhumi Airport as a global gateway.

Border Checkpoints

The major problem confronting these checkpoints is the time-consuming border procedures. Solutions to quicken the process such as issuing permit papers and examining cargos are necessary.

b. Development of domestic transport linkages for continuous, convenient and safe domestic transportation

The approach aims at creating a shift from road-based transportation to transportation by rail and water, especially for the transport of goods in great quantities or over long distances. There has been a development approach employing hub-and-spoke management. However, construction of recent hubs has not been successful because it failed to consider the commodity flow rate in certain areas and also lacked efficient management. As a result, hubs turned out to be a cost-increasing burden and a waste of time.

c. Development of an international transport linkage for transport connection with neighboring countries

To realize its vision of transforming Thailand into a “logistics Hub of Indochina,” the Thai government may consider establishing international allies or carrying out negotiations on overseas transportation with its neighboring countries.

2.1.2. Data Linkage System and Database Development

To establish a logistics database, a number of information studies have been conducted, covering both the demand and supply side (i.e., processing and providing information according to demand).

2.1.3. Personnel and Knowledge Base Development

The Ministry of Commerce and the Thai National Shippers’ Council has created the *Strategy Map: National Capacity Building on Logistics 2005-2009*, which is organized around four perspectives: logistics strategy, learners, process, and learning and development.

2.1.4. Logistics Service Providers Development

Focusing on small and medium-sized logistic service providers, the main approaches seek to prevent price-cutting and capacity-building.

2.1.5. Regional Trade Linkage

International collaboration is crucial if Thailand is to become the gateway of Indochina. Essential approaches include alliance building, preparation for global changes and development in laws, regulations, and policies to promote trade and linkage of logistics system with neighboring countries.

2.1.6. Development of Laws Related to Thailand’s Logistics System

Thailand’s legal issues concerning logistics system need to be developed, revised, and updated. Effective enforcement is also crucial. The Ministry of Transport Operation

Plans and Projects has an urgent plan for logistics system development, which expects to decrease the ratio of the logistics costs to the GDP as well as shorten the operation time for both importers and exporters.

2.2. Future Plans

2.2.1. Future Plans for Road Infrastructure

Roadways. The Department of Highways is the main agency responsible for improvement of the national roadway network. Currently, 13 motorways projects, for a total of 4,150 km, are being constructed. They are to be completed in 2016.

Bangkok and Surrounding Area Express Roadway Project. The Expressway and Rapid Transit Authority of Thailand is currently undertaking a total of five projects to support the growth of traffic in Bangkok and surrounding area.

Four-Lane Highway Widening Project. This project aims to improve the state highway route, which connects Bangkok and other important provinces. The project costs 103,300 million baht.

Roadway Network Connection with Neighboring Countries. To connect the country's internal roadway network with those of neighboring countries and to promote Thailand as the center of provincial land transport, the Department of Highways' development plan includes:

- a. Highway Development among Countries in Greater Mekong Sub-region Cooperation (GMS Cooperation)
- b. ASEAN Highway Network development. And
- c. ASIAN Highway Network

2.2.2. Future Plan for Railways

The State Railway of Thailand has prepared the following infrastructure development projects:

a. National double-track partial construction. The State Railway of Thailand has prepared the Track-doubling Master Plan for the construction of double tracks rails lines, initially focusing such construction in congested areas.

b. Double-track construction for East Coast Railway. The objective of the project is to increase the capacity and the efficiency of the east coast railway in order to support the growth of commodity transport, especially from the expansion of the Laem Chabang port. The project consists of two sections—the Chachoengsao-Sriracha-Laem Chabang and Chachoengsao-Khlong Sibkao-Kang Koi, which are expected to be completed by 2010 and 2012, respectively.

c. Double-track construction for Maptabao-Pakchong-Nakhonratchasima route and realignment. Currently, the SRT is preparing the project's terms of reference. The project covers the period 2009-2014.

d. Railway Maintenance Phases 4, 5, and 6. Phases 1 to 3 have been completed. When phases 4 to 6 are completed, the tracks will be able to support trains at a maximum speed of 160 km per hour.

e. Supplementary equipment: five locomotives and 125 container bogies. The objective of the project is to increase the efficiency of rail freight transport and promote rail transport as an alternative mode of transportation.

2.2.3. Future Plan for Waterways

The use of waterway transport has thus been promoted to utilize the existing natural infrastructure.

2.2.4. Future Plan for Coastal Transport

The Pak Bara deep sea port development is currently at the survey/design and project feasibility study stage. The improvement of Kan Trang port is expected to be finished by August 2008.

2.2.5. Future Plan for Air Transport

Government projects for the development of air transport are the Suvarnabhumi Airport construction project and the improvement of the Chiang Mai and Phuket airports, envisioned to become provincial aviation centers.

2.2.6. Future Plan for Pipelines

Two pipeline transport expansion projects; the North Region Network and North-Eastern Region Network are under studied. The third Master Plan of Natural Gas Pipeline System 2001-2011 has been approved; thus, the network of pipelines for natural gas transport will be expanded. It is also possible that energy transport be expanded among GMS countries.

3. IMPORTANT ISSUES IN INFRASTRUCTURE SECTOR IN THAILAND

There are three important issues in the transport infrastructure sector in Thailand, namely, modal shift and intermodal transport issue; cross boarder transport agreement for market integration; and pricing for the infrastructure issues. We describe these issues as follows.

3.1. Modal Shift and Intermodal Transport Issue

As earlier mentioned, Thailand's freight transport is dominated by road transport. This mode is beset by problems like pollution and congestion, which are not adequately handled. The Thai government has tried to enforce the policy to shift the road transport to more efficient and environmental-friendly modes, namely, railway and waterway.

A modal shift occurs when one mode has a comparative advantage in a similar market or route over another. Comparative advantages can take various forms, such as better services, innovative products, costs, capacity, time, flexibility or reliability.

A modal shift from road to rail could thus be achieved if the State Railway of Thailand (SRT) offers to the customers comparative advantages over competing modes of transport that are significant enough to influence the key players (e.g., shippers, freight forwarders, shipping companies, etc.) in their transport mode decision. However, before such competitive advantages can be identified or generated, the railway sector as a whole has to be revitalized so that a series of legal, institutional, organizational, and infrastructural prerequisites are fulfilled and SRT is faced with similar conditions as competing modes.

For a modal shift to occur, the following prerequisites have to be fulfilled:

- a. Broadening the focus of SRT (logistics strategy).
- b. Implementation of logistics strategy (Concept for SRT logistics).
- c. Proper legal and institutional framework for SRT.
- d. Infrastructure development.

Intermodality is extremely vital to developing competitive alternatives to road transport. Relevant institutions need to build intermodal transport chains to combine the advantages of road transport (e.g., geographic coverage, flexibility, small loads etc.), which are particularly suited to pick-up and final delivery, with those of the alternatives modes (cost reduction through consolidation, accessible capacity, energy diversification, safety) for the main haul.

Due to restrictions of the railway as a transport mode in door-to-door services, the needed measures focus not only on accomplishing the legal, institutional and organizational prerequisites for a modal shift but also on the linking up of the various transport modes. There can be no significant modal shift without intermodality.

3.2. Cross-Border Transport Agreement for Market Integration

An important development of the GMS¹ market integration in recent years is the GMS Cross Border Transport Agreement (CBTA). This is in line with the ADB program to develop the economics corridors. Although the Agreement was ratified in 2003, all protocols were only signed in mid-2007. Furthermore, the implementation of this Agreement progresses slowly, and many barriers exist (Vienna Consult and TDRI, 2006). Still, logistics improvement via the cross-border transport feasible. The Agreement should be a concrete starting point for study from which policy recommendation for better integration of the GMS economy can be derived.

GMS integration is enhanced by the trade flow activity, especially cross-border trade. There are many examples pointing to the importance of cross-border trade as the key to better integration, such as the European Single Market program and NAFTA. By studying the NAFTA and Canada-US Free Trade Agreement, Woudsma (1999) pointed out that understanding freight flows is critical to all trade initiatives, because the increasingly competitive nature of trucking industry requires a close examination from the government. The changing spatial pattern of transportation flows is critical to issues related to safety, environment, and the supply and maintenance of infrastructure. Lastly, both the NAFTA and FTA explicitly include provisions directly related to the harmonization of freight transportation regulations in North America. In Europe, in its task to create a Single Market, the European Union (EU) adopted a series of measures aimed at liberalizing road freight transport and harmonizes conditions to allow for a level playing field in the market. Boylaud and Nicoletti (2001) pointed out that, in EU, there was an increase in cross-border traffic once trade barriers affecting road freight were removed, but the specific impact of road freight liberalization is more difficult to gauge as it is recent and was introduced against the background of the creation of the Single Market. However, trade and transportation are closely related. Improvement of transportation facilities should increase cross-border trade.

¹ The Greater Mekong Sub-region (GMS) comprises Cambodia, Lao PDR, Myanmar, Thailand, Vietnam, and the Yunnan Province of China.

To efficiently facilitate the market integration in the GMS, the CBTA is an important step stone to fulfilling the objective of market integration. However, the process of the implementation of the CBTA is rather slow, due to many reasons.

First, the impact of the implementation of the CBTA is unclear. The main ambiguity can be identified in many aspects, ranging from economic impacts (such as effects of commodities sales in the area), social impacts (such as migrant labor and social security), to environmental problems caused by the cross-border traffic. This makes the process slow as each member has no clear idea of the benefits, how to cope with the impact, and how to convey to the public the advantage and disadvantage of the CBTA. Lack of clarity on benefit sharing from the CBTA is clearly a significant problem.

Second, the improvement in transport infrastructure should reduce transport and logistics costs. However, the unclear implementation plan of the CBTA means that logistics providers have difficulty evaluating the benefit of the scheme. A study by Vienna Consult and TDRI (2006) quoted many shippers' statements on the unclear implementation plan of the CBTA that:

- a. Although Thailand has signed the CBTA, it still does not seem to have a program to implement it in a coordinated way.
- b. The challenge to the GMS governments is management and coordination of their many agencies.
- c. The shippers and transport operators do not need subsidies and protection from the government. They need a clear transport policy so they know what to do and how to earn money.

Benefit distribution is still another important issue. The question is whether the benefit will be allocated to specific groups of importer/exporter.

Third, the issue of different transport regulations must be addressed. Each vehicle that travels through countries needs to comply with regulations of the host country. These regulations include driving license, vehicle standard (dimension, weight, axels load etc.). A common standard is needed for various national transportation systems. ESCAP

(2003) address an important issue of how such technical standardization can be applied in a realistic manner to a particular land transport route.

These are general observations of barriers that need to be explicitly addressed so the implementation of the CBTA can be successful. Furthermore, some specific issues should also be addressed.

Following is a list of four specific issues confronting the CBTA:

Transit traffic. First, Article 8 of the CBTA states that transit traffic shall be exempt from any custom duties and taxes and charges levied on transit traffic shall only be cost related. In theory, the charge on the transit traffic should reflect a true cost (both economic and social) that the transit traffic created. It should include not only the road construction and maintenance, but also environmental, costs. Moreover, infrastructure charging should not apply only to the transit traffic but also to domestic traffic, as most vehicles are not paying for the infrastructure they use via the annual vehicle taxation system in the host country. This is a complicated matter but has to be considered in the future as market-oriented integration in the GSM proceeds. (This is discussed further in the section on exchange of commercial traffic rights.)

Exchange of commercial traffic rights. This issue relates to Article 19 on the traffic right. It states that the operators (of GSM origins) have rights of transit through, inbound, and outbound operations. However, cabotage (or transport within a country) shall only be permitted on the basis of a special authorization from the host country. At this point, the intention of the agreement is to create a free market system, but this will be difficult in practice because the capabilities of operators in each country are different. It might be the case that operators in more advanced countries will dominate the market and leave no room for small operators from less developed countries. Although the Article 23 suggested a quota system according to the National Transport Facilitation Committee of each contracting party, the practical implementation plan has not yet been formalized. Furthermore, the pricing condition of transport is an important issue. According to Article 24, price setting for cross-border transport will be free and determined by market forces, but subject to antitrust restrictions and supervision of the

Joint Committee so as to avoid excessively high or low pricing. This leaves a big responsibility for the Joint Committee to monitor and control the cross-border transport operations.

Vehicle importation and infrastructure standard. The regulation of road vehicles and infrastructure capacity should be clearly identified in each country. Although the ideal system is that the GMS countries will use the same standard of vehicles and infrastructure systems, it is almost impossible to do so. Where vehicles are concerned, two considerations are important, namely, technical requirements and temporary importation of motor vehicles. In terms of vehicle requirements, the applicable standards of home and host countries should be compatible, such as safety standards and weights, axle loads and dimensions. Ideally, the harmonization of vehicle specifications should be encouraged. But it seems impossible in practice. This issue will be a key question to the harmonization of the system or minimizing the impacts of different regulations.

Institutional framework. The institutional framework is set in Part VIII of the In the CBTA. The Agreement identifies two committees: National Transport Facilitation Committees and Joint Committee. Both the National Transport Facilitation Committees and Joint Committees still need to define their concrete responsibilities and operations. They should act as regulators that enhance the cross-border transport.

These various barriers to the effective implementation of the CBTA need to be dealt with in order to bring about efficient logistics that will further promote growth and poverty reduction within the GMS region. These will be the focus of research in this project.

3.3. Infrastructure Pricing

Economic theory suggests that infrastructure charges should reflect the social marginal cost of adding an extra vehicle kilometer to the existing use of a road. This implies calculating and charging for the additional cost imposed on society

with regard to road maintenance, accident risks, congestion, and damage to human health and the environment from exhaust emissions and noise (Kageson 2003).

In Thailand, the charging for infrastructure is not consistent. Moreover, with the GMS-cross border activity in mind, the systematic approach to infrastructure charging is certainly required, especially for the heavy goods vehicles. However, it is very difficult to develop a charging scheme. Even the EU countries have a wide variety of the Heavy Goods Vehicles (HGV) charging systems. Sundberg and Cunningham (2002) summarize the levy charges for HGV use across the EU and Scandinavian nations into six schemes: Eurovignette, Vehicle Tax, Fuel Price, Fuel Duty, Road Tolls, and Other User Charges.

Of these measures, Eurovignette and Vehicle Tax are of interest. The former was established by the Benelux countries, Denmark, and Germany in 1995; Sweden joined the system in 1998. The idea was that through the Eurovignette, participating countries would receive financial compensation for the wear and tear caused by HGVs, using their road networks. In each of the participating countries all vehicles with a gross vehicle weight in excess of 12 tons are liable for the charge. The Eurovignette directive (EU 1996) aimed to soften the impact of competition on the road freight sector caused by the existence of vastly different methods and levels of charging for the infrastructure use in different countries.

A study to aid the harmonization of the heavy goods vehicles charge by Nash et al. (2003) compared the charging systems of the heavy good vehicles across EU countries. In this regard they listed the following characteristics that were relevant to the study:

- a. Roads to which the charges is applied to
- b. Lorry weight charged
- c. Vehicles charged (domestic and/or foreign)
- d. Cost categories included in calculation
- e. Type of charge (time or distance based)

- f. Factors by which charge rates are varied
- g. Revenue use
- h. Other policies alongside tolls to ease implementation
- i. Technical implementation and collection of billing data

This is an important issue that deserves further investigation. Although it is too early to do a design based on the charging scheme, the above list nonetheless provides an overview of the characteristics that should be taken into account when implementing such a charge. Furthermore, this list will be very valuable when the benefit sharing options for the cross-border transport movement in the GMS are analyzed in the future.

4. POLICY RECOMMENDATIONS

The policy recommendations for the infrastructure sector in Thailand involved three major issues: infrastructure, laws and regulations, and supportive measures.

4.1. Developing a policy document

In developing the infrastructure, one needs to consider not only how to construct the infrastructure per se, but also how to utilize the existing infrastructure and identify and prioritize the infrastructure development plan in the future. A report by Thammasat University ² suggested that the government prepare a White Paper outlining infrastructure development strategies for transport sector. The White Paper should provide long-term objectives, targets, strategies, and developments plans, including infrastructure project planning for the next 15 years. It should aim to prepare the investment plan and address vital issues such as management, human resource, technology, and environment.

² Thammasat University (2004) The Study of Infrastructure Development Strategy to Support the Country's Competitiveness: Transportation Sector, report to the National Economic and Social Development Board, December 2004.

In fact, the Ministry of Transport has produced a White Paper called "Transport for Thailand's Sustainable Development" in June 2007³. This White Paper revealed its vision as 'To develop the country's transport systems with higher quality and efficiency in service deliveries for a good quality of life, and sustainability for the country'.

To fulfill this vision, the White Paper identified seven development guidelines—Transport for Economic Development, Transport for Society, Transport for Energy Saving and Environmental Protection, Transport for Area and Urban Development, Transport for Links to Neighbouring Countries, Good Governance in Transport, and Human Resources Development for Transport. The objectives of these guidelines are as follows:

- a. Ensure sound quality in transport routes and vehicles with a view to making them safe, convenient, and responsive to the people's needs.
- b. Promote the development of transport modes that support livability, sustainable communities (which are convenient, clean, safe, systematic, etc.)
- c. Promote public transport to provide alternatives to cars in urban areas
- d. Create a transport network with a high level of multi-modal integration
- e. Make existing transport network work more efficiently in a more environmental-friendly way
- f. Stimulate and attract more investments in both production and service sectors in the regions
- g. Provide greater opportunity for private sector participation in the development of transport systems
- h. Develop human resources and management systems to enhance quality and efficiency in transport systems

However, the White Paper is just a starting point for the formulation of a long-term policy through a policy document. Pursuing a long-term planning is still needed. Coming up with a White Paper should apply to each strategic sector: road, railway, Aviation, and waterway and shipping. Therefore, the Thai Government should produce

³ Ministry of Transport (2007) Transport for Thailand's Sustainable Development, June 2007.

such policy documents in order to provide both public and private stakeholders the guideline for the development of the transport sectors in the future.

4.2. Transport Infrastructure Development

There are seven important components in infrastructure development strategies in transportation, which are

- a. To construct inter-city motorways for the north-south and the east-west corridor,
- b. To construct a high-speed train system whose minimum speed is at least than 200 km/hr to meet the future demand of commercial passenger transportation. Add to this the need to construct double-track in various corridors and to restructure the organization of the state railways of Thailand based on a transportation reform. Lastly, there should also be efforts to lend support to members of the private sector that wants to be transport operators while keeping the safety regulations and maintenance under government control.
- c. To develop sea motorways to meet the demands of freight transportation between the East coast, the South and the area around Chao Pra Ya River; to avoid land transportation through Bangkok and vicinities,
- d. To develop deep sea ports, coastal ports, and river ports so that they could cope with a skyrocketing demand of water transportation in the future,
- e. To develop international and regional airports so that they could meet the future demand of air freight and passengers which tends to be rising,
- f. To build logistics centers in important border points, among others, along the north-south corridor, the east-west corridor and at intersections of main transporting routes. These are to be used as a hub for collecting and distributing goods to different part of the country and neighboring countries,
- g. To construct transportation center for passenger transportation so as to promote public transportation.

4.3. Law, regulations, and rules

The law necessitates action. For example, it states that the office of transport and traffic policy and planning, which is under the umbrella of the ministry of transportation, is responsible for laying down the country's transportation policy. The appointment of a transportation policy commission whose representatives are from both the government and private sectors. It also specifies that an independent organization be set up to regulate transportation in economic aspects and defines its roles and qualifications of a commission. It requires that regulating authorities be established in different modes of transportation and that SoE Co. be organized in accordance with the guidelines of state enterprises reform. This is similar to the State Railways of Thailand's proposal to restructure the organization by establishing the SRT operation Co. SRT Rolling Stock, and the SRT assets management Co.

A discussion among ASEAN countries is likewise in order. It aims at improving the cooperative framework on facilitating freight transportation across borders and rules concerning height, width, length and weight of trucks- especially to increase the maximum weight of three-axle truck (10-wheels) to 10 tones.

4.4. Enhancing the regional integration through cross-border transport

Deeper and broader integration with neighboring countries in the region and beyond would enable the GMS countries to have better access to markets for their products as well as capital and technology necessary and appropriate for their further development. Through market integration, GMS countries would also be able to allocate and utilize their resources more efficiently. They would have even greater development opportunities through dynamic effects of regional market integration.

However, the development impact of regional integration may not be fully realized should the transaction cost of trade between and among member countries remains so high that the gains from trade are at best minimal. Transport and logistics cost is known to be a major component of transaction cost. In the GMS countries, transport infrastructure and logistics facilities and services are mostly under developed and hence remain a major obstacle to market oriented integration in the region. It has been argued

that reducing the cost and improving the quality of logistics and transport systems improve international market access and lead to increasing trade and investment and hence higher income and greater scope for poverty reduction (Carruther et al.,2003).

As the Asian Development Bank (2004) has stated, improving GMS connectivity will not only increase the volume of trade but also affect the pattern of trade in a way that increases gains. Improvements in roads reduce transport costs and also encourage interregional trade. This enhances the competitiveness of GMS members. Investments in connectivity have large impacts on poverty reduction by generating income and employment. By linking poor, remote villages to markets, such roads can also help reduce non-income poverty through access to health and education services (ADB, 2004). However, ADB also stated that a key characteristic of transport investments, especially road investments, to date is that they tend to be developed from national rather than regional perspectives, with corresponding difficulties in maximizing the benefits and opportunities from regional corridors. The challenge here is to develop mechanisms that allow for regional perspectives and the quantitative assessment and distribution of benefits and costs to be built into projects from inception (ADB, 2004). Although ADB is the major player in initiating the Cross-border Trade Agreement (CBTA), the implementation of this agreement needs cooperation from each GMS member.

To reduce the cross-border trade barriers, a number of policy scenarios on logistic cost reduction should be examined. One of these is the software measures to facilitate the cross-border economic activities. These measures include the distribution of costs and benefit of the infrastructure improvement project among the various countries. ADB (1999) pointed out that project costs and benefits are not equally distributed among the member countries. An example is the Kunming to Chiang Rai Road Improvements, where most of the benefits are expected to accrue to Yunnan Province and Thailand, but major investments will be required in environmentally and socially sensitive areas of the Lao PDR. Another example involves the East West Economic Corridor (EWEC). Nemoto and Kaji (2002) said that the present bottlenecks occur at the river crossing of Mekong River between Mukdahan and Savannakhet, and at National Route 9 consisting

of an approximate 200-kilometer road link from Savannakhet to the Viet Nam border. They raised the issue of how the National Route 9 can be operated and maintained. Clearly, maintenance costs should be charged to whoever is responsible for traffic passing through this route. However, a systematic approach of infrastructure charging is needed to share the costs and benefits of this logistics improvement.

4.5. Supplementary measures

Drawing up public service obligation contract. It is to be used as a principle and conditions for giving compensation to operators that incur losses such as a third-class passenger transportation operated by the State Railway of Thailand and non-air conditioned passenger buses provided by Bangkok Mass Transit Authority.

Accelerating the creation Public Services Agreement (PSA). The PSA is an agreement between a commission of budget policy and a minister whose annual budget is tied with governmental organizations or state enterprises. By so doing, the public services will be achieved. Cooperate governance, including accountability, transparency and the disclosure of output/outcome to the public will all be promoted.

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