Initial Assessments of Road Transport Infrastructure and Transport and Logistic Services for Trade Facilitation in the GMS Countries

Draft Final Report

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ABBREVIATIONS

AC – asphalt concrete
ADB – Asian Development Bank
AEC – Asian Economic Community
AH – Asian Highway
ASEAN – Association of Southeast Asian Nations
BCP – Border Control Point
BOT – Build Operate Transfer
CAPEX – capital expenditure
CAREC – Central Asia Regional Economic Cooperation
CBF – cross border facility
CBTA – Cross-Border Transport Agreement
CC – Central Corridor
CFS – container freight station
CIF – carriage insurance freight
CIQS – Customs, Immigration, Quarantine, Security
COMTRADE – United Nations Commodity Trade Statistics Database
C/T/R – Cost/Time/Reliability
DBST – double bituminous surface treatment
DOH – Department of Highways
EC – Eastern Corridor
ECF – Economic Corridor Forum
EWC – East-West Corridor
EU – European Union
FCL – full container load
FDI – foreign direct investment
FMCG – fast moving consumer goods
FOB – free on board
GDP – Gross Domestic Product
GMS – Greater Mekong Subregion
GMS TSS – GMS Transport Sector Strategy Study
GRM – gross refining margin
HCMC – Ho Chi Minh City
ICD – inland clearance (container) depot
IMT-GT – Indonesia Malaysia Thailand – Growth Triangle
IWT – inland waterway transport
JAL – Japan Airlines
JICA – Japan International Cooperation Agency
JIT – just-in-time
JV – joint venture
km – kilometer
LCC – low cost carrier (airline)
LPG – liquid petroleum gas
MOT – Ministry of Transport
NC – Northern Corridor
NEC — Northeastern Corridor
NR — national road
NSC — North-South Corridor
OPEC — Organization of the Petroleum Exporting Countries
PDR — Peoples Democratic Republic
PPAR — project/program performance audit report
PPP — public private partnership
PPTA — Project Preparation Technical Assistance
PRC — Peoples Republic of China
REG — regional
SASEC — South Asia Subregional Economic Cooperation
SC — Southern Corridor
SCC — Southern Coastal Corridor
SF — Special Fund
SOE — state owned enterprise
TA — technical assistance
TEU — twenty feet equivalent (container size)
TOR — terms of reference
UK — United Kingdom
ULD — unit load device
UN — United Nations
UNESCAP — United Nations Economic and Social Commission for Asia and the Pacific
US — United States of America
VLCC — very large crude carrier (tanker)
WC — Western Corridor
WTO — World Trade Organization
3PL — third party logistics (operator)

NOTE
In this report, "$" refers to US dollars.
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EXECUTIVE SUMMARY

i. The objective of this study\(^1\) is to undertake initial (desk-top) assessments of road transport infrastructure and of transport and logistics services for enhancement of trade facilitation in the GMS countries. These assessments will be used as the basis for the Terms of Reference (TOR) for the more detailed and comprehensive follow-on study to be undertaken by a firm\(^2\). Trade facilitation in this study is taken in its wider context of ‘helping the business of trading’, rather than the more common narrower focus on customs and border activities.

ii. The scope of the road transport infrastructure assessment includes an examination of each of the major road transport corridors and linkages in the GMS highlighting their roles in the movement of international trade, identifying any residual bottlenecks and network gaps and from these, indicating and prioritizing potential ‘hard’ infrastructure investment projects that will promote trade facilitation in the subregion. The scope of the supporting transport services and logistics assessments encompasses profiling of the transport sectors by mode and their competitive role in providing services to the trading community, an appraisal of the existing logistics sector and its future potential in relation to trade activities and an analysis of international trade to and from GMS countries to determine the scale of the demand for transport services carrying trade traffic with mapping of the primary trade transport routes.

A. Transport Infrastructure Assessment

iii. The major trade transport corridors for GMS countries for both international and intra-GMS trade is expected to be those serving the ports. This is due to the dominance of maritime transport in the overall movement of the subregion’s trade. The termini for some GMS corridors are large port complexes located near major expanding industrial/manufacturing/agro-economic zones, such as Laem Chabang in Thailand’s Eastern Seaboard and the Ho Chi Minh City complex of port facilities in Viet Nam. Others have secondary feeder ports acting as gateways at the end of trade corridors, for example the ports of Da Nang, Hai Phong, Sihanoukville and Yangon, that also contribute significant trade volumes to the dominant maritime trade subsector. The road subsector dominates land transport movements both in terms of trade traffic and domestic traffic.

iv. The first comprehensive transport infrastructure assessment along these corridors was made under the GMS-TSS in 2004-05\(^3\). It identified more than 30 high-priority transport projects, of which 18 were in the road sub-sector. Of those 18 all have either been implemented or are in the process of implementation except the Xieng Kok (Lao PDR) – Kyaing Lap (Myanmar) Mekong River Bridge which is the subject of recent bilateral discussions.

v. North – South Corridor (NSC). The NSC is the backbone of the GMS corridor network, as it dissects the center of the GMS region and intersects all of the other 8 GMS corridors. With the completion this year of a new 30 km 4-lane Chiang Rai to Chiang Kong Project and the scheduled completion in 2014 of the Houayxay – Chiang Kong Mekong River Bridge the last significant road gaps will be closed between Kunming and Bangkok. One bottleneck will still remain along the extension of the NSC south of Bangkok; the congested section of highway

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\(^1\) The consultant team consisted of Robert M. Anderson, Transport Specialist, Anthony N. Bayley, Logistics Specialist; and Panisara Suebchaiwang, Research Assistant.

\(^2\) Due to budget constraints, at this draft final report stage, consideration may also be given to carrying out the follow on assessment utilizing a team of individual consultants.

between Hat Yai and Sadao at the Malaysian border. Thailand is planning to construct a new motorway from Hat Yai to the border. The Department of Highways has designated this project for implementation under a PPP.

vi. **Eastern Corridor (EC)**. The EC essentially follows Highway No. 1 in Viet Nam, the backbone of the Viet Nam road network, with a branch link Ha Noi to Hai Phong and two branches from Ha Nroi to PRC, one to Kunming and one to Nanning. Utilizing its own budget, Viet Nam together with assistance primarily from the ADB, the World Bank and JICA, has implemented and/or has programmed, a number of road improvement projects to increase capacity along this corridor. Of importance to trade facilitation are the ring roads/by-passes, which are presently being implemented/planned around HCMC and Ha Noi. All major gaps and bottlenecks in the corridor have been implemented or are in the implementation planning stage.

vii. **East – West Corridor (EWC)**. The EWC was envisioned as a key regional corridor since the conceptual formulation of the GMS in 1992. Under the GMS Transport Master Plan in 1995 it was identified as one of the three initial corridors. Although it is centrally located and bisects four of the six GMS countries, it connects to only a few large cities. It does not pass near major industrial zones and primarily passes through agricultural and forest areas. One remaining section to be improved, Phitsanulok to Lom Sak, is being upgraded to 4-lane divided highway standard with assistance under the ADB GMS Highway Expansion Project. The upgrading of the section from Tak to Mae Sot is under construction by the DOH, mostly to a 4-lane standard, but there are residual 2-3 lane sections through the hilly terrain in the mid-section.

viii. In 2004-2005 Thailand agreed to assist Myanmar in the upgrading/repair of the initial 17 km of the Myanmar road section along the EWC, beginning at the Mae Sot/Myawaddy border crossing. This was completed in 2008 using Thai grant aid totaling baht 119 million (about $4 million). Subsequently, in January 2012 the two governments agreed to implement a second Thai grant for baht 1,140 million (about $37 million) to be provided to Myanmar, which will extend the upgrading and new road construction as far as Kawkareik.

ix. **Southern Corridor (SC)**. The Southern Corridor linking Dawei, Bangkok, Phnom Penh and Ho Chi Minh City, according to most regional studies is likely to become one of the major trade corridors in the GMS. As part of a multi-purpose Dawei port/industrial complex, presently being implemented, the road from the port of Dawei to Kanchanaburi (Thailand) will be upgraded, including the Myanmar/Thai cross border facilities. The upgraded road is planned to connect to a future Bang Yai – Kanchanaburi Motorway in Thailand being implemented with technical assistance from the ADB. In Thailand, under the GMS Highway Expansion Project a 73 km section of road between Phanom Sarakham and Sa Kaeo is being upgraded to a 4-lane highway, which when completed will provide a continuous series of 4-lane divided and/or motorway standard roads along the SC between Bangkok and Cambodia.

x. There is severe congestion at the Aranyaprathet - Poipet border crossing. This has been a bottleneck for a number of years and will only get worse as time goes on. This is the busiest border crossing between Thailand and Cambodia and will remain so well into the future. The need for a bypass at this critical border crossing has been known for a number of years and discussions between the two countries, often with ADB acting as the honest broker, have been off and on for a decade. In Cambodia most of the road links along both subcorridors of the SC

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4 In all such studies only the central subcorridor of the SC has been assumed to become a major trade corridor and not the northern subcorridor.

5 Bong Ti (Myanmar) – Sai Yok (Thailand)
been implemented or are being implemented, except the Siem Reap to Stung Treng link along the northern subcorridor of the SC. This section has never been implemented and is unlikely to be implemented in the foreseeable future. Cambodia requested this road section for ADB financing, but the cost was extremely high and the new route would have severe environmental impacts.

xi. Phnom Penh is at the crossing of two major trade/transport corridors, the Southern and Central Corridors. Most road sections leading to Phnom Penh have already been upgraded, but there is a high degree of congestion on all major routes as they reach the outskirts of Phnom Penh. The Phnom Penh municipal government and the national government are keenly aware of the need for one or more bypasses/ring roads around Phnom Penh, but to date little significant progress has been made in moving forward on this issue. In Viet Nam the SC (central subcorridor) along Highways 22 and 7 was upgraded by the ADB about 7 years ago. The Viet Nam MOT has plans to again upgrade this Highway 22/7 corridor to expressway standard with a connection to the Third HCMC Ring Road, which is now under construction with assistance from the ADB.

xii. Southern Coastal Corridor (SCC). The SCC is an important corridor in terms of the Eastern Seaboard area of Thailand, the coastal areas of Cambodia and the Mekong Delta area of Viet Nam, but in terms of traffic generation and trade facilitation between the three countries it is a relatively minor corridor. The only significantly congested sections of the SCC in Thailand are the lack of highway capacity along the extension of Highway 7 and along Highway 3 connecting to the port of Laem Chabang. The Thai DOH is continually upgrading the road sections leading to Laem Chabang and is expected to continue to do so. In Cambodia, road links along the SCC have been or are in the process of being upgraded with the major on-going improvements being financed under the ADB assisted GMS Southern Coastal Corridor Project (Additional Funding).

xiii. Central Corridor (CC). The CC was not one of the original three corridors identified in the GMS Transport Master Plan (1995), but as it has developed over the years it is now one of the major transport corridors in the GMS. The CC is composed of major road links in three GMS countries: (i) in Lao PDR it follows the 13/N/13S from the PRC border at Boten to the Cambodia border; (ii) in Thailand from the Lao PDR border south through all the major cities of the Northeast Region to Laem Chabang; and (iii) in Cambodia it is the only major north-south link in the country from Lao PDR to Phnom Penh, then along Route 4 to Sihanoukville. Road links in Thailand have all been upgraded as has the entire length of 13N/13S in Lao PDR. The major infrastructure bottleneck along the CC is at Phnom Penh where Routes 7 and 6 from the north need to efficiently connect to Route 4 to Sihanoukville in the south.

xiv. Northern Corridor (NC). The NC is primarily an east-west link located along the breadth of Yunnan Province from the Gulf of Tonkin on the east and traversing northern Myanmar on the west before reaching the Indian border at Tamu. Through a series of PRC-funded and ADB assisted projects, the NC in the PRC has, for the most part been, or is being, upgraded to a full expressway standard. Based on present initial assessments it appears that the PRC is also adequately addressing potential bottlenecks near and around, the two major urban centers of Kunming and Nanning. In Myanmar, along the NC, the 176 km Lashio – Muse Road (at the PRC border) has been upgraded to AH Class III and is being operated on a private BOT basis. The remaining section of road from Lashio to Mandalay along the NC is reportedly in fair condition, as is the road from Mandalay to Monywa. From Monywa to the Indian border at

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6 Along the central subcorridor of the SC.
Tamu the road is in need of upgrading. There are a number of roads in the north of Myanmar which feed to the NC that have recently been upgraded with grant aid financing from PRC (Yunnan Province).

xv. **Western Corridor (WC).** The WC is entirely located in Myanmar, but has important connections to the EWC near Mawlamyine and to the NSC via a short connection through Thailand to Tak. It is not entirely clear as to why the original concept of the WC did not continue north along AH1 past Meiktila to Mandalay in order to connect to the NC. From a trade perspective and also from a transport planning aspect that would appear to have been the more desirable corridor alignment. All trade routes as they develop in this northern part of Myanmar will undoubtedly pass through Mandalay and follow the alignment of the NC to Tamu. The most apparent gap along the WC is tied in with the extension of the EWC from Kawkareik to Payagyi. The improvement of this gap section is expected to be divided into two projects: Kawkareik to Thaton and Thaton to Payagyi.

xvi. **Northeastern Corridor (NEC).** The NEC is not a well-conceived corridor, particularly with respect to trade facilitation. In Thailand it is positioned between two main Thai highway corridors: the NSC (Highway 1) and the Thai subcorridor section of the Central Corridor (Highway 2), with the NEC not aligned with any primary Thai highway route. It partially follows Highways 1, 21 and 203 north from Bangkok and eventually ‘disappears’ just south of Dan Sai, at which point almost all of the traffic continues along route 203 to Loei. There is 35 km ‘corridor gap’ in the primary Thai highway network before reaching Lao PDR; although this is not considered a gap by the Thai DOH and there is no Thai priority to improve the connection from Highway 203 to the Lao PDR border. The NEC has another major missing link between Luang Prabang and the junction with NR 1C, near Nam Neun. Due to very rugged terrain and sparse population and traffic in this mountainous area, it is unlikely that this gap will ever be closed.

xvii. The ADB Northern GMS Transport Network Project is improving the NEC south of Luang Prabang to Thailand; and in the northeast region of Lao PDR and in Viet Nam, the on-going ADB Second Northern GMS Transport Network Project has been designed to close other gaps along the NEC by upgrading and reconstruction of 195 km in Viet Nam and 144 km in Lao PDR.

**B. Transport Services Assessment**

xviii. Freight transport is a ‘demand responder’ not a demand creator or trade generator. International and domestic transportation services are based on providing clients with the optimum service standard - a balance between cost, speed/time and reliability - for the movement of their specific product. These service standards usually dictate the optimal mode of transport to be used, assuming a modal alternative is available and act as a key product differentiator between the various service providers. Air freight tends theoretically to be competing with sea freight, and road freight competes with rail freight, but in reality modal competition is limited and there is a relatively small overlap. Most competition is within modes rather than between modes.

xix. Demand for air freight transport in GMS is growing, but the primary demand is for long-distance movements with only very small volumes of intra-GMS traffic. The subregion is well served by both network carriers and charter operators and sufficient service capacity is available. Airport infrastructure is sufficient, though cargo facilities at some airports will require upgrading due to more unit load handling.
xxx. Sea freight will remain the dominant international transit mode given the GMS reliance on external trade and the concentration of demand and production along the seaboards. The region is generally well served, but will continue to rely on feeder services with limited mainline vessel calls. The role of ports in trade logistics and in corridor development/prioritization may be easily underestimated. Consideration should be given to embracing ports as ‘gateways’ to GMS corridors because the road sections closest to the ports tend to carry the highest volumes of trade traffic. International funding institutions still have an important role in port infrastructure development in the GMS, especially at secondary ports. Private sector investment is likely to be concentrated on port superstructure and equipment.

xxi. Rail transport tends to be an underutilized transport mode in the movement of international trade in the GMS. The principle reason for this situation is the limitations of the network, particularly in terms of its regional connectivity with few international linkages. Rail organizations in the region generally have a poor comprehension of what type of traffic is best suited to their range of services and what potential users need – they lack customer-orientation. There is an overreliance on low freight charges as a method of retaining and attracting freight as opposed to offering better more reliable services possibly at a higher cost.

xxii. Road transport accounts for most of the trade logistics in GMS. However, this is predominantly in support of the maritime mode as a collection and distribution service rather than as an international carrier. Cross border trade movement in the GMS are small compared to volumes through the ports. The road sector in many countries is dominated by owner-drivers and small operators with a few second-hand vehicles. There is a gradual increase in larger fleet operators with new heavy articulated transport units, especially around ports and major conurbations and performing international transport. These changes should result in improved service standards. Fleet modernization is required in all countries.

xxiii. Trade facilitation at borders remains a key constraint for international road transport. Because of delays at the borders and the need for ‘facilitation payments’ to expedite performance, transport rates are higher than they should be as operators build such risks into their charges. Early resolution of these barriers appears unlikely, but should remain an important goal for the GMS initiative. International road transporters generally would like to see improvements of both roads and border operations along certain key trade corridors. However, the need is probably for fewer better performing linkages rather than ever more crossings with variable performance – focused development.

xxiv. GMS has an extensive network of inland waterways, of which the main route in terms of trade logistics is the Mekong River. In general, the inland waterways are used principally for passenger services and the localized domestic movements of lower value goods in bulk and agricultural produce. The main use of inland water transport on the Mekong River is in the upper reaches for cross border trading activities; and in the lower reaches connecting Phnom Penh with the sea and servicing Saigon port. The main problem for IWT is the variation in water levels which seriously restrict navigation in the dry season.

C. Logistics Assessment

xxv. Logistics is seen as a separate industry by the third party logistics operators active in the industry. This differs from the institutional perception which tends to regard logistics as transport. Logistics is about management of the supply chain and inventory control rather than solely the simple physical movement of product. Trade logistics is the management of the
supply chain in an international context and includes the moving of products over international borders.

xxvi. Logistics is a service industry and is therefore demand driven. Globally the demand drivers have been the major retailers and multinational companies. These organizations increasingly outsource the management of their supply chains to third party logistics providers who in turn are seeking to provide integrated services, thus extending their control along the logistics chain. The domestic logistics industry in the GMS region is relatively immature due to the lack of demand drivers in the domestic sector, such as major retailers and manufacturers capable of dictating their supply chains, the limited presence of multinationals and a willingness to outsource.

xxvii. The international sector is much more developed, being driven by the needs of overseas customers to control their supply chains. Many of the GMS countries are export manufacturing-oriented and given the use of certain trading terms, the routing control is predominantly with the overseas importers. They appoint a logistics operator to handle their traffic resulting in the international sector being dominated by foreign operators or joint ventures.

xxviii. Fragmentation of the transport and forwarding sectors in most GMS countries with many small operators with limited resources means they lack the ability to develop into either domestic or international 3PL operations. The application of logistics activities in the domestic market is considered to be low in Cambodia, Lao PDR and Myanmar, a little higher in Vietnam and highest in PRC and Thailand, but still low compared to developed countries. This is principally due to the lack of demand drivers and potential national service providers.

xxix. The application of logistics services in the international sector is much more widespread in GMS countries especially in relation to the garment and higher value manufacturing sectors. This is due to pressure from overseas customers and the presence of foreign or joint venture 3PLs. There is a need to encourage foreign operators, especially joint ventures, to help build up a national capability. Consolidation within the transport and forwarding sectors is essential to establish entities of sufficient size to undertake 3PL services.

xxx. The sector does not require further regulation as it operates best in a lightly regulated environment and most of the activities involves in logistics are already subject to some regulation. There is a need to stimulate competition based on flexibility and innovation rather than developing separate regulations. The logistics sector will need to gradually diversify to handle more types of product as it is currently concentrated on a relatively limited range of commodities. Development of trade logistics within the region using 3PLs is not an option, but will be mandatory to maintain growth in trade with developing countries.

D. Identification of Primary Road Transport Trade Routes

xxxi. Comprehensive data on international trade traffic flows moving along the various GMS corridors and other routes is not generally available. Most GMS studies have been reliant on the use of macro-economic trade data based on value when projecting freight traffic flows and future growth, whereas in practice freight transport demand is volume or tonnage-related. In very few cases has route specific data been collated and analyzed to calculate the trade traffic volumes likely to move along particular corridor links.

xxxii. Despite the growth in intra-GMS trade in recent years, this only accounts for about 10% of total trade. The implication therefore is that almost 90% is external trade. This tends to be
supported by the limited traffic data from the border crossings, which indicate that in the GMS there are very few busy borders (i.e. over 200 trucks per day). Thus, it is necessary to assess the transport infrastructure and transport services in the context of supporting this external trade, rather than only focusing on intra-subregional connectivity. Since almost all of this external trade moves via the maritime modes, this suggests it is important to focus on port connectivity and infrastructure, as well as the corridors and border crossings. Indeed, the highest volumes of trade passing along the corridors tend to be close to the ports.

xxxiii. The trade corridor mapping under this study is based on identifying the ‘busiest’ sections of the various corridors from a trade perspective based on information from previous studies and discussions with transporters. No attempt has been made at this stage, on quantification or comparing one corridor versus another. Each of the GMS Corridors has been assessed, plus any other road links indicated as carrying significant amounts of trade. The primary trade routes are considered to be as follows:

- Trade Route 1: North-South Corridor via Lao PDR (AH2/AH3), especially close towards the southern end near Bangkok/Laem Chabang;
- Trade Route 2: Southern Corridor between Bangkok and Ho Chi Minh City via AH1, especially on the Thai and Vietnamese sections;
- Trade Route 3: Central Corridor between Bangkok and Vientiane via AH2;
- Trade Route 4: Yangon - Mandalay route (AH1), incorporating the Payagyi - Meiktila section of the Western Corridor;
- Trade Route 5: Bangkok - Payagyi via Mae Sot – Myawaddy using combination of North – South and East – West Corridors (AH1);
- Trade Route 6: Northern Corridor between Kunming and Nanning;
- Trade Route 7: Eastern Corridor between Kunming and Hai Phong via AH14; and
- Trade Route 8: Central Corridor between Phnom Penh and Sihanoukville via AH11.

E. Trade Logistics Support Infrastructure

xxxiv. In the general context of trade logistics there are expected to be three principle types of infrastructure investment facilities required to support trade facilitation, other than the road or rail infrastructure. These are the border crossings, inland clearance depots and ports. There are significant delays at many of the GMS border crossings. While the dominant causes are the procedures and the need to transship cargoes, this can be compounded by poor design and shortage of infrastructure. There are inadequacies in border infrastructure on the Myanmar side of the East - West and North - South Corridors and on the Cambodian side of the Southern Corridor.

xxxv. The potential for the development of more inland clearance facilities is constrained by trade imbalances and that the primary trade demand tends to be along the seaboards. The lack of a competitive rail network/service with block trains is a further constraint. Should trade traffic become more balanced and there are more bilateral trade movements by road, the private sector is expected to respond and construct such appropriate facilities.

xxxvi. Maritime transport is expected to be the dominant transport mode for movement of international trade, even for intra-GMS trade. Investment in the port sector for bulk cargo handling terminals will be predominantly provided by the private sector, but for general cargo and containers facilities public sector investment will probably be required, particularly in terms
of channels, breakwaters and quay walls. The private sector will mainly focus on providing the superstructure under concession agreements. Investment in the port sector in Myanmar has been constrained, in part due to the sanctions and reduced volumes of trade. The changing situation suggests that there will be an urgent need for investment if unrestricted trade is permitted otherwise port congestion will be a likely consequence.

F. Summary Preliminary Evaluation of Initiatives and Transport Sector Investment Projects

xxxvii. The infrastructure assessment identified six locations/areas along primary road transport trade routes where there are infrastructure bottlenecks and gaps that potentially adversely affect trade facilitation. Two of the bottlenecks were not considered as potential investment projects: the highway congestion around and leading to Laem Chabang port, since the Thai DOH is expected to adequately address this issue and the potential bottleneck at Luang Prabang where the CC, the NEC and the Mekong River all converge, since it is assessed that there is no apparent need for ADB assistance as Lao PDR is planning to address this issue.

xxxviii. Five potential trade investment projects in the road and trade facilitation subsectors have been identified and all four will be included in the TOR for the follow-on study for possible ADB participation. These potential five are as follows, in order of priority:

Upgrading of the Kawkareik – Thaton Road Project (AH1) along East-West Corridor (EWC and WC).

xxxix. Beginning in 2004 Thailand has, over the intervening years, provided about a $41 million in grant aid to Myanmar for the upgrading (and new road construction) of the initial 46 km of the EWC from the Thai border at Myawaddy to Kawkareik at the foot of the Dawna Mountain Range. The road from Kawkareik to Payagyi is yet to be upgraded. The next priority for improvement along the AH1 corridor is the Kawkareik to Thaton Road (approximately 134 km). The project should probably be implemented in two phases: (i) Kawkareik to Eindu; and (ii) Eindu to Thaton, with Eindu being the match line between the East-West Corridor and the Western Corridor. The project would necessarily also include upgrading a major bridge structure, the Thanlwin Bridge (Hpa-an) about 685 m in length. Clearly the upgrading of this major structure could easily end up being a subproject of the overall project and a likely candidate for co-financing by either Japan or Korea. A potential third phase of the project would be to improve the connection to the Port of Mawlamyine, but present indications are that implementation of such a connection is not a priority in terms of trade facilitation. It is recommended that the PPTA for this project include a component to study the need for and location of, an upgraded road connection to Mawlamyine. The budget cost estimate to upgrade the 134 km road section between Kawkareik and Thaton would be in the range of $60-75 million, not including any major reconstruction Thanlwin Bridge (Hpa-an), except for minor widening/repair. This project is considered the highest priority investment based on the initial assessments undertaken in this study.

Bypass Road and Infrastructure Improvements, Aranyaprathet – Poipet Border Crossing Project

xl. The highly congested areas surrounding this primary Thailand-Cambodia border crossing have suffered from decades of poor urban and transport planning. The congestion has been greatly compounded by the construction (approximately 5-7 years ago) of a number of mid-rise gambling casinos/hotels, plus other commercial developments scattered in and around the border crossing facilities. The result is a severely dysfunctional border crossing with no readily available options at the existing location to improve the operational characteristics and efficiency of the cross-border transport of goods and people. A specific border crossing
improvement project to upgrade the Aranyaprathet – Poipet crossing has been the focus of attention between Thailand, Cambodia and the ADB for a number of years, but the parties have been unable to agree on a mutually acceptable solution\textsuperscript{7}. Based on previous site visits and discussions with knowledgeable and concerned individuals, a bypass of the Aranyaprathet/Poipet area, probably along a northern bypass alignment, is the only logical solution to facilitate cross border movements at this location. An estimate of the cost for the bypasses and border improvements is in the range of $30 to $40 million. It can be assumed that the eventual financing for work on the Cambodian side would be financed with assistance from the ADB (and possibly also from Thailand), while the improvements on the Thai side would be financed by Thailand. This project is considered the second highest priority investment based on the initial assessments undertaken in this study.

Development of the Myanmar – Thailand Border Infrastructure Project

xli. At the important Myawaddy – Mai Sot border the Thai Government is proposing construction of a second bridge and a freight bypass avoiding both town centers linking into a special trade zone on the Myanmar side. Indications are that funding has not included the provision of a border checkpoint and freight transfer terminal on the Myanmar side. It is unlikely that CBTA arrangements will permit through transport in the near future and therefore the need to transfer loads on one side or the other will continue for some time. A similar situation exists on the North-South Corridor at the Tachilek - Mae Sai border with indications that facilities on the Myanmar side of the border are poor and this is resulting in road traffic between Thailand and PRC being diverted through Laos PDR. It is proposed the situation on funding at both these borders be clarified with the relevant authorities and the need for external funding of both border check points and road transfer terminals be then identified. The budget cost for such facilities at each location would be approximately $5-10 million per border depending on their complexity. It is envisioned that if this project moves forward, a detailed feasibility study at each location should be undertaken including concept design for the new border check points and associated facilities. This project is considered as the third priority investment based on initial assessments.

Phnom Penh Bypass Project

xlii. A major land transport bottleneck along the SC and the intersecting CC is the urbanized area of Phnom Penh. Solving the present traffic congestion and lack of connectivity between the major corridors is compounded by the existence of three major rivers: Tonle Sap, Bassac and Mekong Rivers. Since 2007 JICA has been attempting to move forward with a comprehensive Ring Road Master Plan study for Phnom Penh, but with limited success. To date little actual progress has been made in implementing much needed bypasses of the city. The ADB role is envisioned to initially provide a PPTA (i) to review the existing alignment for the Phnom Penh Ring Road that is being proposed by the Phnom Penh city government; (ii) then prepare a detailed feasibility study on a particular segment (or segments) of the future Ring Road that will provide the highest initial economic rates and most efficient diversion of traffic around the city; and (iii) provide financial assistance for the construction of these initial ring road segments. Depending on the policy of the city government, it can be expected that the PPTA will also consider alternate public sector financing of this project through an appropriate PPP.

\textsuperscript{7} With the change in government in Thailand in 2011, it can be contemplated that the time may be at hand where both countries can now agree on a solution to this issue.
Yangon Port and Road Access Assessment

xlii. Yangon Port consists of a series of wharves located predominantly along the city’s waterfront and therefore much of the trade traffic passes through the city centre. The main container operations are located at the Myanmar International Terminals Thilawa (MITT) on the east side of the river towards the river mouth. A major concern is the impact of the removal of sanctions which would be expected to place an immediate strain on the port infrastructure and its access points. The market penetration of containerization in general cargo imports and exports in particular, is significantly lower than in other GMS countries. The expected high growth, especially in container traffic, could result in both congestion within terminals and in the immediate environs in metropolitan Yangon, along the river bank and across the Thanliyin Road-Rail Bridge and the more easterly road bridge connection, both of which connect to Thilawa. It is proposed that an assessment be made of the development needs of the Yangon Port complex, especially the need for container capacity expansion and supporting Container Freight Stations and Inland Container Depots, combined with an assessment of the road network connecting these various port facilities with both the city’s main industrial centres and the Asian Highway 1. The objective would be to identify potential investment needs, both in terms of road and port infrastructure, required to handle the substantial traffic increase.

G. Summary of Scope of the Follow on Assessment

xliv. The Terms of Reference (TOR) for the follow-on TA is being prepared as a separate deliverable under this consulting assignment. Based on discussions with the ADB it is understood the preferred procurement method to carry out the assignment will be through the use of a consulting firm, rather than individual consultants and that the budget for this TA is $400,000, with the TA consultant being located in Bangkok. Based on these guidelines the proposed staffing of the follow-on TA has been estimated to require 10 person-months of international specialists and 11 person-months of national specialists. The duration of the assignment would be 4 months. TA staffing would include transport and road specialists, a trade facilitation/border infrastructure specialist, a transport economist, a private sector/PPP specialist, resettlement/social/gender specialists, environmental specialists and a research assistant.

xlv. In general the work to be undertaken will be a continuation of the initial assessments, but with a focus on specific selected priority infrastructure projects. The TA consultant will undertake a series of site visits to each of the proposed investment projects and undertake spot surveys/interviews, meet with officials and stakeholders and with other donor partners. Based on the information gathered, the consultant will then prepare a preliminary scope of each potential project, including safeguard considerations and a budget estimate of costs for civil works and/or consulting services. After discussions with the ADB, two of the potential projects will be selected for final scoping and costing. The consultant will then prepare TORs for PPTA consultants to prepare the two projects for ADB financing.
I. BACKGROUND AND OBJECTIVES

A. Background

46. The concept of a Greater Mekong Subregion (GMS), Economic Cooperation Program was initially formulated in 1992. Throughout the intervening 20 years, investments in the transport sector have primarily promoted regional integration, improved connectivity and to a lesser extent, the direct facilitation of trade among GMS members. To a large extent, this remains the case through to the present time. In 1995 the ADB, for the first time under the GMS program, formulated a Transport Master Plan that identified priority transport infrastructure investments. Subsequently in 1998 this Transport Master Plan was updated incorporating the economic corridor concept identifying three main (economic) corridors: North-South, East-West and Southern. In 2003 the Transport Master Plan was further upgraded when GMS countries first agreed to include the GMS Cross-Border Transport Agreement (CBTA)\(^8\) initiative.

47. The Transport Master Plan (1995) served the GMS countries well for the ensuing 5-7 years, but by 2002 it became clear to GMS political leaders and transport ministers that stronger transport systems and logistics were necessary to increase GMS cooperation and to improve economic linkages with other counties and regions. In response to this need, in 2004 the ADB provided technical assistance funding for the GMS Transport Sector Strategy Study, herein referred to as the GMS-TSS. The GMS-TSS was a comprehensive study that developed a GMS transport sector strategy which was designed to cover the period 2006-2015 and highlighted (i) the identification and prioritization of investment and technical assistance projects; (ii) the formulation of action plans to implement the GMS-TSS; and a (iii) redefining and updating of GMS corridors. From the basic three original corridors identified in 1998, the GMS-TSS expanded the concept to nine corridors\(^9\). These are shown in Figure 1.1.

| i. North-South Corridor (NSC): | Kunming to Bangkok |
| ii. Eastern Corridor (EC): | Kunming to Ca Mau |
| iii. East-West Corridor (EWC): | Mawlamyine to Da Nang |
| iv. Southern Corridor (SC): | Dawei to Quy Nhon/Vung Tau |
| v. Southern Coastal Corridor (SCC): | Bangkok to Nam Can |
| vi. Central Corridor (CC): | Kunming to Sihanoukville/Sattahip\(^10\) |
| vii. Northern Corridor (NC): | Fangcheng to Tamu |
| viii. Western Corridor\(^11\) (WC): | Tamu to Mawlamyine |
| ix. Northeastern Corridor\(^12\) (NEC): | Thanh Hoa to Bangkok/Laem Chabang |

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\(^8\) A multilateral legal instrument among GMS countries to allow easier (seamless) movement of people, goods and vehicles across borders of member GMS countries.

\(^9\) There is a lack of consistency within ADB references as to GMS corridors being referred to as “corridors” or as “economic corridors”, or sometimes a mixture of both nomenclatures. For this report all are referred to as “corridors”.

\(^10\) The terminus of the Thailand subcorridor of the CC as indicated in ADB documents is at the Thai naval base port of Sattahip. It is recommended that the next ADB update of this subcorridor (as depicted on THA-09-3704 HR), should indicate the CC terminus as Laem Chabang.

\(^11\) In some ADB documents WC is still referred to as the Northwest Corridor; in this report the Western Corridor designation will be used which is believed to be the current designation.

\(^12\) The location of the NEC has indicated in ADB references has varied over time and originally connected to PRC.
48. The support for increased trade between GMS countries was one of the main objectives of the GMS-TSS. The ADB support for trade facilitation has continued through the years and has recently been augmented by the 44174-012: Support for Implementing Action Plan for Transport and Trade Facilitation in the GMS which is a cluster TA. This cluster TA is designed to have 10 outputs encompassing trade facilitation, transport facilitation, capacity development and legal/regulatory development. This assessment consultancy has been undertaken as part of subproject 1 (TA-7851(REG)) under this cluster TA.

B. Objectives

49. The objective of this study is to undertake initial (desk-top) assessments of the road transport infrastructure and the associated transport and logistics services for enhancement of trade facilitation in the GMS countries. These assessments will be used as the basis for the Terms of Reference (TOR) for a more detailed and comprehensive follow-on study to be undertaken by a firm. Trade facilitation in this study is taken in its wider context of ‘helping the business of trading’, rather than the more common narrower focus on customs and border activities. The scope of the road transport infrastructure assessment includes an examination of each of the major transport corridors and linkages in the GMS highlighting their roles in the movement of international trade, identifying any residual bottlenecks and network gaps and from these indicating and prioritizing potential ‘hard’ infrastructure investment projects which will promote trade facilitation in the subregion.

50. The scope of the supporting transport services and logistics assessments encompasses profiling of the transport sectors by mode and their competitive role in providing services to the trading community, an appraisal of the existing logistics sector and its future potential in relation to trade activities and an analysis of international trade to and from GMS countries to determine the scale of the demand for transport services carrying trade traffic with the mapping of the primary trade transport routes.

51. The next scheduled Economic Corridor Forum (ECF) for GMS countries is scheduled to be held in late June 2012. In anticipation of this meeting, the scope of work for this assignment includes preparation and presentation of key excerpts and findings of these initial trade facilitation assessments during the 2012 ECF and also at GMS regional workshops and at ADB as required.

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13 Project No. 44174-01 in the amount of $5.70 million provided by a grand for the Government of Australia, envisaged to comprise three subprojects: $2 million (2010-12) and the second and third subprojects for $1.85 million each for the years 2012-2014 and 2014-16.
II. INFRASTRUCTURE ASSESSMENT

A. Trade Transport Corridors

52. The major trade transport corridors for GMS countries for both international and even intra-GMS trade are expected to be those serving the ports. This is due to the dominance of maritime transport in the overall movement of the subregion’s trade. The termini for some GMS corridors are large port complexes located near major expanding industrial/manufacturing/agro-economic zones, such as Laem Chabang in Thailand’s Eastern Seaboard and the Ho Chi Minh City complex of port facilities in Viet Nam. Others have secondary feeder ports acting as gateways at the end of trade corridors such as the ports of Da Nang, Hai, Phong, Sihanoukville and Yangon that also contribute significant trade volumes to the dominant maritime trade subsector.

53. However, it is the road mode that dominates land transport movements, both in terms of trade traffic and domestically. Road transport acts as the main collector and distributor of this seaborne trade, as well as performing intra-subregional movements that represent a relatively minor segment of overall trade activity. Domestic non-trade related transport cargo within each GMS country also predominately utilizes road transport corridors to move freight with 80-90% of freight movements being by transported by road in most GMS countries. The major road transport corridors for each GMS country are summarized in Table 2.1.

<table>
<thead>
<tr>
<th>GMS Country</th>
<th>Major Road Corridors/Operating Conditions</th>
</tr>
</thead>
</table>
| Cambodia    | • Route 1: Phnom Penh – Svay Rieng – Bavet (VIE border)  
• Route 2: Phnom Penh – Takeo – Phnom Den (VIE border at Tinh Bien)  
• Route 3: Phnom Penh – Kampot – Veal Rean and Kampot – Prek Chak/Lork  
• Route 4: Phnom Penh - Sihanoukville  
• Route 5: Phnom Penh – Sisophon – Poipet (THA border)  
• Route 6: Phnom Penh – Skun – Sisophon  
• Route 7: Skun – Kompong Cham - Stung Treng – Traapaing Kreal (LAO border)  
• Route 19: Stung Treng - Le Tranh (VIE border)  
• Route 48: Chamkar Luang (Jct. Hwy. 4) – Kon Kong Cham Yeam (THA border)  
| Roads along most major corridors are 2-lane, AC and DBST paved and in general have been recently upgraded (single digit highway number designations). Future ADB support in Cambodia is targeted to provincial and rural roads.  
Core issues along major routes are road maintenance and truck overloading; a first and second road asset management project utilizing private contractors for pavement overlays is being implemented along most major corridors.  
Major road bottlenecks are at Poipet, including the border crossing with Thailand at Aranyaprathet; at urbanized areas in and around Phnom Penh; along Hwy. 1 from Phnom Penh to the Mekong River at Neak Luong; and the Mekong River crossing at Neak Luong where a new Mekong River bridge is being implemented with assistance from Japan. |
| Lao PDR     | • NR 13N/13S: Boten (at PRC border) – Luang Prabang - Viethiane – Pakse – Veunekham (CAM border)  
• NR 3: Houayxay (at THA border) –  
| Roads along most major corridors are 2-lane, DBST paved, with 90-95% in good/fair condition; many road sections and bridges suffer from lack of funding for routine and periodic maintenance. |

14 All GMS countries, except Lao PDR have railways, but the lines service only limited freight and passenger demands. In general GMS railways are narrow gage (1 m), single track and with limited capacities. Air travel is the mainstay of international passenger travel in GMS countries; and there is limited demand for air freight except for very high value cargo.
<table>
<thead>
<tr>
<th>GMS Country</th>
<th>Major Road Corridors/Operating Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louang Namtha – Boten (PRC border)</td>
<td>The major gaps in the major road network are in the north, primarily in the northwest of the country along the NEC from Luang Prabang to the junction with NR 1C near Muang Hiam (Vieng Thong), other bottleneck include the urbanized area areas around Luang Prabang, where the NEC, the CC and the Mekong River all intersect.</td>
</tr>
<tr>
<td>• NR 9: Savannakhet – Dane Savanh (VIE border)</td>
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<tr>
<td>• NR 8: Ban Lao – Nam Phao (VIE border)</td>
<td></td>
</tr>
<tr>
<td>• NR12: Thakhek – Heu (VIE border)</td>
<td></td>
</tr>
<tr>
<td>• NR 4: Mitaphab Bridge (at THA border at Tha Li) – Luang Prabang</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>In general there is a lack of road and bridge maintenance along most major road corridors; including the lack of bridge capacity at numerous large river crossings. Along the NSC, the alternate R3 connection through Myanmar, Tachilek - Kengtong - Mongla, has been upgraded to AH, Class III, comprised of: (i) Mongla (PRC border) – Kengtong (93 km); and (ii) Kengtong - Tachilek (Thailand border at Mai Sai) about (163 km), upgraded through Thai grant aid and is presently being operated on a private BOT basis.</td>
</tr>
<tr>
<td>• Hwy 68/8/1(AH1): Myawaddy – Yangon – Mandalay – Tamu</td>
<td></td>
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<tr>
<td>• Hwy 3: Muse – Mandalay</td>
<td></td>
</tr>
<tr>
<td>• Hwy 4: Tachilek – Mandalay</td>
<td></td>
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<tr>
<td>• Hwy 8: Kawthonig – Dawei – Mawlamyine</td>
<td></td>
</tr>
<tr>
<td>PRC (in GMS Provinces connecting to GMS countries)</td>
<td>Existing and/or under construction expressways service the major corridors in the two GMS provinces; in general motorway operating conditions are good and adequate maintenance is be provided, although only about 70% of total maintenance funding is being provided on all Yunnan roads.</td>
</tr>
<tr>
<td>• Kunming - Jinghong – Mohan (LAO border)</td>
<td></td>
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<tr>
<td>• Jinghong – Daluo (MYA border)</td>
<td></td>
</tr>
<tr>
<td>• Kunming - Hekou (VIE border)</td>
<td></td>
</tr>
<tr>
<td>• Nanning – Pinxiang (VIE border)</td>
<td></td>
</tr>
<tr>
<td>• Nanning – Dongxing (VIE border)</td>
<td></td>
</tr>
<tr>
<td>• Nanning – Litang – Gullin – (Hunan Province)</td>
<td></td>
</tr>
<tr>
<td>• Longban – Baise – Hechi</td>
<td></td>
</tr>
<tr>
<td>• Kunming - Daguan – (Sichuan Province)</td>
<td></td>
</tr>
<tr>
<td>• Dali – Lijiang – (Xizang Province)</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>Improvements of road and bridge infrastructure along major road corridors are the most developed and best maintained of GMS countries, primarily consisting of high speed, 4 and 6-lane divided highway links; but with few sections of limited access expressways. For the most part all road sections along major corridors are adequately maintained. The most significant physical bottleneck in the road sub-sector is the lack of motorway (limited access) capacity leading into and out of the Bangkok Metropolitan Region (BMA). Among the constraints that have led to this issue are an out dated motorway master plan and delays in developing and enacting a PPP legal framework to attract private sector financing for the expansion of the motorway network. The only active ADB loan in Thailand is for the GMS Highway Expansion Project.</td>
</tr>
<tr>
<td>• Hwy 1: Bangkok – Chiang Rai – Mae Sai (MYA border)</td>
<td></td>
</tr>
<tr>
<td>• Hwy 2: Bangkok – Khon Kaen – Nong Khai (LAO border)</td>
<td></td>
</tr>
<tr>
<td>• Hwy 3: Bangkok – Tradi – Khlong Yai (CAM border)</td>
<td></td>
</tr>
<tr>
<td>• Hwy 4: Bangkok – Songkhla - Hat Yai – Sadao (MAL border)</td>
<td></td>
</tr>
<tr>
<td>• Hwy 12/105: Mukdahan – Khon Kaen – Tak – Mae Sot (MYA border)</td>
<td></td>
</tr>
<tr>
<td>• Hyw 11: Singburi - Utharadit</td>
<td></td>
</tr>
<tr>
<td>• Hwy 21/203: Saraburi – Phetchabun – Nakraseng/Tha Li (LAO border)</td>
<td></td>
</tr>
<tr>
<td>• Hwy 33/359/304: Bangkok – Aranyaprathet</td>
<td></td>
</tr>
<tr>
<td>• Hwy 304/331: Nakon Ratchasima – Laem Chabang</td>
<td></td>
</tr>
<tr>
<td>• Hwy 344: Chonburi – Klaeng</td>
<td></td>
</tr>
</tbody>
</table>

15 Of the 51,500 km of national highways in Thailand, only about 450 km, or less than 1% are controlled access roads. Source: Department of Highways.
16 The BMR consists of six provinces: Bangkok which also has the status of a province; and the following five provinces, Samut Prakan, Nonthaburi, Nakhon Pathom, Phatum Thani and Samut Sakhon.
17 Loan-2608 THA: Greater Mekong Subregion (GMS) Highway Expansion Project; June 11, 2010. The Project will upgrade 178 km of two-lane national highways to four-lane divided highway standard; Highway 12 from Phitsanulok to Lom Sak (73 km) on the EWC; and Highway 359 from Phanom Sarakham to Sa Kaeo (73 km) along the SC.
GMS Country | Major Road Corridors/Operating Conditions
---|---
Viet Nam | • NR 1: Ca Mau – HCMC – Ha Noi – Lang Son
• Route 3: Ha Noi – Thai Nguyen – Ta Lung
• Route 18/2/70: Hai Phong – Ha Noi – Lao Cai
• Route 8: Cau Treo – Duc Tho (to Vinh)
• Route 13/14: HCMC – Pleiku – Da Nang
• Route 19: Quy Nhon – Pleiku – Le Thanh
• Route 22: HCMC – Moc Bai – Tay Ninh – Tan Hoa
• Route 9: Lao Bao – Dong Ha (to Da Nang)
• 1A/80: Nam Can – Ca Mau – Rach Gia – Xa Xia

Most roads along major corridors are 2 and 4 lane, recently paved and upgraded sections; but many bridges have not been upgraded and lack load carrying capacity. Road maintenance is improving, but large sections of roads and bridges along major corridors still lack sufficient funding for routine and periodic maintenance. In general, Viet Nam has stressed the upgrading of national roads, primarily those along major route corridors, at the expense of funding the improvement of provincial and local roads. The limited access expressway network is still in its infancy but significant progress has been made in recent years with the assistance of the ADB, the World Bank and Japan. Most expressway planning programs are concentrated around the urbanized areas of Ho Chi Minh City and Ha Noi, with links to be provided to the port complexes near HCMC and to Hai Phong. In the long term Viet Nam has plans to implementation of the North-South Expressway, from Can Tho in the south to the Chinese border in the north.

54. The first comprehensive transport infrastructure assessment along these corridors was made under the GMS-TSS in 2004-05. That study identified more than 30 high-priority transport investment projects, of which 18 were in the road sub-sector. Those initial road sub-sector projects are summarized in Table 2.2, including their implementation history and present status/condition.

Table 2.2: GMS-TSS (2006) Proposed High-Priority Projects

<table>
<thead>
<tr>
<th>Proposal of GMS-TSS</th>
<th>Project</th>
<th>Location/ GMS Corridor</th>
<th>Status/Condition (2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate Implementation without further study</td>
<td>Houayxay – Chiang Khong Mekong River Bridge</td>
<td>Thailand and Lao PDR/NSC</td>
<td>Under construction; expected opening date 2013; financed by PRC and Thailand.</td>
</tr>
<tr>
<td></td>
<td>Route 135 – NR7 Cross Border Section</td>
<td>Lao PDR and Cambodia/ CC</td>
<td>This Veuneukham (Lao PDR) – Dong Kralor/Trapeng Kreal (Cambodia) border crossing has been upgraded and is operating normally.</td>
</tr>
<tr>
<td></td>
<td>Sisophon – Poipet/ Aranyaprathet Road (reinstatement)</td>
<td>Cambodia/ SC</td>
<td>Road sections already upgraded/reconstructed, primarily under the GMS: Cambodia Road Improvement Project(^\text{18}) (CRIP), which also included a component to improve the Poipet cross border facility that was never implemented in any significant degree.</td>
</tr>
<tr>
<td></td>
<td>NR33: Kampong Trach–Lork Viet Nam border</td>
<td>Cambodia</td>
<td>Being implemented under the GMS Southern Coastal Corridor Project (Additional Financing), Loan 2373-CAM, award approved in April 2011.</td>
</tr>
</tbody>
</table>

\(^{18}\) Loan 1945-CAM (SF) in the amount of $50.0 million, approved 26 November 2002; effective 20 May 2003.
<table>
<thead>
<tr>
<th>Proposal of GMS-TSS</th>
<th>Project</th>
<th>Location/ GMS Corridor</th>
<th>Status/Condition (2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Priority based on results of other studies</td>
<td>Rte 14A: Junction Rte 16 Pakse – Wat Phu – Lao PDR/Cambodian Border</td>
<td>Lao PDR/CC</td>
<td>Implemented under the Champasak Road Improvement Project.</td>
</tr>
<tr>
<td></td>
<td>Pakse – Xekong (direct route, paving/reconstruction)</td>
<td>Lao PDR/</td>
<td>Upgraded/reconstructed throughout to an all-weather 2-lane DBST paved roadway.</td>
</tr>
<tr>
<td></td>
<td>Mawlamyine – Mudon – Thanbyuzayat (upgrading)</td>
<td>Myanmar/</td>
<td>No major upgrading/improvement; and is not presently a priority project of Myanmar; although a priority project of the Government is the upgrading of the road from Thanbyuzayat south to Dawei and Kawthon.</td>
</tr>
<tr>
<td></td>
<td>Rte 4: (Lao PDR/Thai Bridge at Nam Heuang) Nakha – Sanyaboury – Xieng Nger</td>
<td>Lao PDR/ NEC</td>
<td>Presently under upgrading/reconstruction under the Northern Greater Mekong Subregion (GMS) Transport Network Improvement Project.</td>
</tr>
<tr>
<td>Under study during GMS-TSS</td>
<td>Transport Corridors in Lao PDR northern region</td>
<td>Lao PDR/ NEC</td>
<td>Some road sections in both Lao PDR and Viet Nam along the NEC are presently under upgrading/reconstruction under the Second Northern Greater Mekong Subregion (GMS) Project.</td>
</tr>
<tr>
<td></td>
<td>Ha Noi – Lao Cai expressway</td>
<td>Viet Nam/ NC</td>
<td>The entire Noi Bai-Lao Cai Highway (about 260 km) will link Ha Noi with the Chinese expressway network in Yunnan Province under Loans 2391VIE and 2392 VIE totaling $1.096 million.</td>
</tr>
<tr>
<td></td>
<td>Thakhek – Nakhon Phanom Bridge</td>
<td>Lao PDR and Thailand</td>
<td>Third Thai-Lao Friendship Bridge was inaugurated in November 2011, connecting the Northeastern “Issan” Region of Thailand with the Central Region of Lao PDR; it is located along AH 15 providing the most direct connection between Thailand and Viet Nam at Vinh.</td>
</tr>
<tr>
<td></td>
<td>Dau Giay – Lien Khuong Expressway</td>
<td>Viet Nam</td>
<td>The Ho Chi Minh – Long Thanh – Dau Giay Expressway is presently under construction through and engineering loan and a construction loan with a completion target 2013.</td>
</tr>
<tr>
<td></td>
<td>Phnom Penh – Sisophon and Phnom Penh – Sihanoukville (rehabilitations)</td>
<td>Cambodia</td>
<td>All sections along both road links have been rehabilitated/upgraded under a series of internationally financed projects.</td>
</tr>
<tr>
<td>New Corridor Strategic Project</td>
<td>Baise – Longlin Expressway</td>
<td>PRC</td>
<td>The 177 kilometer (km) express was constructed under the Western Guangxi Roads Development Project.</td>
</tr>
<tr>
<td></td>
<td>Baise – Debao – Longbang (Viet Nam Border) Expressway</td>
<td>PRC</td>
<td>Under planning/implementation with assistance from ADB.</td>
</tr>
<tr>
<td></td>
<td>NR66: Siam Reap – Preah Vihear – Stung Treng</td>
<td>Cambodia</td>
<td>A new road along this new corridor, the Northern Subcorridor of the SC was never implemented and unlikely to be implemented in the foreseeable future.</td>
</tr>
</tbody>
</table>

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19 Loan 1369 (SF), Champasak Road Improvement Project for $48 million, completed in 2000; rated “highly successful” by the PPAR.
20 The original Grant 0082-LAO (SF) was approved September 2007 for $27 million; and a supplementary grant for $27 million was signed in May 2010.
21 The project approved in November 2010 includes a loan of $75 million for Viet Nam and a grant of $20 for Lao PDR.
<table>
<thead>
<tr>
<th>Proposal of GMS-TSS</th>
<th>Project</th>
<th>Location/ GMS Corridor</th>
<th>Status/Condition (2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thaton – Payagyi – Bagan – Kalay – Tamu/Moreh (Indian Border)</td>
<td>Myanmar</td>
<td>Parts of this corridor (Western Corridor) have been improved by Myanmar particularly along the AH1 section of the “new corridor” up to Meiktila; with the sections through Bagan, Kalay and Tamu still relatively unimproved. Myanmar has stressed following the AH1 alignment between Yangon and Mandalay and not the WC.</td>
</tr>
<tr>
<td></td>
<td>Xieng Kok – Kyaing Lap Mekong River Bridge</td>
<td>Myanmar/ Lao PDR</td>
<td>This is the only high priority road subsector project from the GMS-TSS yet to be implemented, primarily due to lack of Lao PDR and Myanmar funding; also most international and bi-lateral funding entities do not consider it a priority project.</td>
</tr>
</tbody>
</table>

B. Road Infrastructure Assessment along Corridors

55. An infrastructure assessment along each corridor is included in this section in order to provide the basic background information needed for identification of bottlenecks and gaps in the overall GMS corridor network.

1. North - South Corridor (NSC)

56. The North - South Corridor can be considered as the backbone of the GMS corridor network, as it dissects the center of the GMS region and intersects all of the other 8 GMS corridors. The NSC is connected from Kunming to the north and east by links to the PRC national road network and is connected to the south past Bangkok by Highway No. 4, to the Thai-Malaysian border and then by a controlled access expressway all the way through Malaysia to Singapore.

57. There are no significant missing links in the NSC, including the extension of the corridor south to Singapore. The primary bottleneck is along the extension of the NSC south of Bangkok on the congested section of highway between Hat Yai and Sadao at the Malaysian border. The Malaysia side of the border is serviced by a high capacity controlled access expressway, but on the Thai side by a congested 4-lane road without any access controls. The Sadao border crossing combined with road/rail terminal at Padang Besar represents the most active cross border trade location in the GMS. In 2009 the volume of trade at this point was estimated at 300 billion baht (US$9 billion)\(^2\). Thailand is planning to construct a controlled access (new motorway standard) section from Hat Yai to the border (also identified as an infrastructure constraint under IMT-GT studies). The Department of Highways has designated this project for implementation under a PPP and has had preliminary discussions with the ADB to determine if ADB can assist in formulating a PPP financing plan.

\(^2\) Source: Government of Thailand.
### Table 2.3: NSC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>PRC</th>
<th>Lao PDR</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>North-South (NSC)</td>
<td>Kunming to Bangkok</td>
<td>Continuous expressway</td>
<td>Designated in Lao PDR as NR 3,</td>
<td>Chiang Kong – Chiang Rai – Bangkok</td>
</tr>
<tr>
<td></td>
<td></td>
<td>either constructed or</td>
<td>the improvement of the 247 km</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>presently under</td>
<td>route was completed in 2008 with</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>construction/upgrading;</td>
<td>assistance from PRC, Thailand and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>with no significant</td>
<td>A new 30 km, 4-lane project Chiang Rai to Chiang Kong is to open in 2012, which will close the last gap in Thailand along this corridor.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>infrastructure gaps or</td>
<td>with no significant budget for carrying out of periodic and routine maintenance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>bottlenecks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kunming - Mohn</td>
<td>Boten – Houayxay</td>
<td>Houayxay – Chiang Kong Mekong River Bridge under construction; financed by Thailand and PRC; scheduled bridge opening in 2014, which will remove the major bottleneck in the entire NSC.</td>
<td></td>
</tr>
</tbody>
</table>

#### 2. Eastern Corridor (EC)

58. The Eastern Corridor essentially follows Highway No. 1 in Viet Nam, the backbone of the Viet Nam road network, with a branch link Ha Noi to Hai Phong and two branches to Kunming and Nanning in PRC. The Government of Viet Nam fully recognizes the importance of the Highway No. 1 corridor. Utilizing its own budget together with assistance primarily from the ADB, the World Bank and JICA, Viet Nam has implemented and/or has programmed, a number of road improvement projects to increase capacity along this corridor. Of most importance to trade facilitation are the ring roads/by-passes, which are presently being implemented/planned around HCMC and Ha Noi to reach the port facilities serving these two large urbanized areas.

59. Beginning in the early 1990’s the ADB, Work Bank and JICA\(^23\) cooperated in the upgrading of more than 2,000 km of Highway No. 1 from the PRC border in the north to Mu Thuan in the south. After the initial upgrading and reconstruction under these ADB/WB programs, the Viet Nam Government has continued to upgrade, widen and improve this road corridor. The remaining primary constraint along the road is the large number of narrow and limited load capacity bridges along Highway No. 1. Japan assisted in rebuilding most of the long bridges during the 1990’s, but until the present time many of the short bridges are still in need of widening and strengthening.

60. The Lao Cai - Ha Noi Express is presently under construction, with an expected ADB date of completion of 2014. The new ADB assisted Ha Noi – Lang Son Expressway is in detailed design and will run parallel with the existing 4-lane/6 lane highway (ADB2), with construction of the expressway programmed to start in 2015. The Ha Noi – Hai Phong Expressway is under construction using private sector financing. Additionally a North-South Expressway is also presently being implemented by the MOT which, when completed, will add

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\(^23\) The ADB assisted with three sections: Loan 1272 Road Improvement Project, Loan1487 Second Road Improvement and Loan 1653 Third Road Improvement; the World Bank assisted with two sections; and JICA assisted in financing the repair and upgrading on most of the long bridges along all five sections.
even more road capacity along the EC between Ha Noi and HCMC. The completion of the North - South Expressway can conservatively be expected to take at least 10 to 12 more years.

**Table 2.4: EC Assessment Summary**

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>PRC</th>
<th>Vietnam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern (EC)</td>
<td>Kunming and Nanning to Ha Noi and to Ho Chi Minh City</td>
<td>Kunming – Hekou (at VIE border) and Nanning – Pingxiang (at VIE border)</td>
<td>Lao Cai (at PRC border) – Ha Noi – Lang Son (at PRC border); Ha Noi - Hai Phong and Ha Noi – Ho Chi Minh City</td>
</tr>
<tr>
<td></td>
<td>Continuous expressway either constructed or presently under construction/upgrading; with no significant infrastructure constraints.</td>
<td>All Viet Nam sections along the EC have been completed, or are in the implementation stage. The northern section around Ha Noi and to the PRC border and around HCMC will be expressway standard. Sections along the Ha Noi – HCMC section are presently 2 and 4 lane highways upgraded with assistance from ADB, World Bank and JICA. A North-South Expressway is also presently being implemented by the MOT.</td>
<td></td>
</tr>
</tbody>
</table>

3. **East - West Corridor (EWC)**

61. The East – West Corridor was envisioned as a key regional corridor ever since the conceptual formulation of the GMS in 1992. Under the GMS Transport Master Plan in 1995 it was identified as one of the three initial corridors. Although it is centrally located and bisects four of the six GMS countries, it connects to only few large cities (Da Nang, Khon Kaen and Phitsanulok). It does not pass near major industrial zones and mainly passes through agricultural and forest areas, especially in the long Thai section. The EWC section through Viet Nam, Highway 9 from Dong Ha to Lao Bao was improved by the ADB but is now suffering from lack of maintenance.

62. As part of its Phase I and Phase II 4-Laning Program the Thai Department of Highways (DOH) has 4-laned almost the entire section from Tak to Mukdahan (Highway 12). One remaining section, Phitsanulok to Lom Sak is being upgraded to 4-lane divided highway standard under the ADB GMS Highway Expansion Project. The upgrading of the section from Tak to Mae Sot is under construction by the DOH mostly to a 4-lane standard, but there are residual 2-3 lane sections through the hilly terrain in the mid-section.

63. In 2004-2005 the Government of Thailand agreed to assist the Government of Myanmar in the upgrading and repair of the initial 17.4 km of road section along the East-West Corridor24, beginning at the Mae Sot/Myawaddy border crossing on the Thai/Myanmar Border. The upgrading was competed in 2008 with the amount of Thai aid for this project totaling baht 119 million (about $4 million). Subsequently the two governments again agreed to cooperate in further improvements along this corridor and in January 2012 a second Thai grant in the amount of baht 1,140 million (about $37 million) was extended to Myanmar for the following three components:

- Rehabilitation and repair of the 420 m bridge at the Mae Sot – Myawaddy border crossing (baht 60 million);

24 Mae Sot/Myawaddy – Thinganninyaung (Dawna Range); this initial agreement also included the detailed design of 28.6 km of new construction (along a new alignment) from Thinganninyaung – Kawkareik, an approximate additional total of 28 km.
Additional upgrading of the initial about 17.4 km of the existing Myawaddy road (baht 200 million), project entitled: Mae Sot/Myawaddy – Foot of Dawna Range road section\(^{25}\); and

Building a new road along a new alignment an additional 28.6 km reaching the town of Kawkareik along the EWC\(^{26}\).

A Thai contractor is now mobilizing his workforce and equipment to the Thai side of the border and construction work is expected to commence soon\(^{27}\). The contract period is for 28 months with work scheduled to be completed by May 2014. During this assessment a site visit to the Mae Sot - Myawaddy border area was undertaken\(^{28}\). The logical next section for improvement would be from Kawkareik to Thaton (following the AH1 corridor) along a northwesterly direction a distance of about 134 km. A connection to the port town of Mawlamyine need not be included at this initial stage as it would be costly and not provide any significant trade benefits in the short term.

### Table 2.5: EWC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Myanmar</th>
<th>Thailand</th>
<th>Lao PDR</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td>East-West</td>
<td>Mawlamyine to Dong Ha (and continuation along the EC to Da Nang)</td>
<td>(EWC) MYA: Mawlamyine – Myawaddy (at Thai Border)</td>
<td>Mae Sot (at Myanmar Border) – Khon Kaen - Mukdahan</td>
<td>Savannakhet to Dane Savanah (at Viet Nam Border)</td>
<td>Lao Bao (at Lao PDR Border) to Dong Ha</td>
</tr>
<tr>
<td>(EWC)</td>
<td></td>
<td>Thai financial grant aid funded the initial 46 km from Myawaddy to Kawkareik. The road section from Kawkareik to Thaton should be next priority for improvement along the AH1 corridor.</td>
<td>Entire length planned or recently upgraded mostly to a 4-lane divided highway. ADBs GMS Highway Expansion Project and Thai Government project both under construction will close final gaps.</td>
<td>This road link was improved under three programs: financed by the Government, JICA and ADB. The JICA section required major repairs of failed pavement sections, with repair now being financed with assistance from JICA.</td>
<td>Upgrading of Highway 9 was financed by the ADB; with the major constraint being lack of maintenance.</td>
</tr>
</tbody>
</table>

4. **Southern Corridor (SC)**

The Southern Corridor linking Dawei, Bangkok, Phnom Penh and Ho Chi Minh City, according to most regional studies\(^{29}\) of the GMS is likely to become one of the major trade corridors in the GMS.

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\(^{25}\) Sta. 0 + 000.000 to Sta 17 + 350.000, a distance of 17.35 km

\(^{26}\) Sta. 17 + 241.932 to Sta 45 + 446.379, a distance of 28.6 km

\(^{27}\) The main obstacle in commencing work is that the Myanmar Government needs to approve in advance the list of equipment and personnel that will be working on this project before any site mobilization can take place; and such approvals are still pending.

\(^{28}\) The consultant team received very strong support and assistance from the local DOH, Tak District Office No. 2 (Mae Sot) during the 8-9 March 2012 site visit.

\(^{29}\) For example the Economic Research Institute for ASEAN and East Asia (ERIA), in its 2009 Concept Paper, Mekong-India Economic Corridor Development, identified the Vung Tao, Ho Chi Minh City, Phnom, Penh, Bangkok, Dawei corridor, together with an influence zone of about 100 km on each side of this corridor as a primary regional
66. As part of the Dawei Deep Sea Port and Special Economic Zone Project\textsuperscript{30} the road from the port of Dawei to Kanchanaburi (Thailand) along the SC will be upgraded, including the border crossings facilities at Bong Ti (Myanmar) and Sai Yok (Thailand). The detailed design of the road is on-going with construction already having begun. The ADB is presently carrying out technical assistance for the PPP arrangement of the Bang Yai – Kanchanaburi Motorway Project\textsuperscript{31}. The study is expected to be completed in 2013. Under this study the ADB will assist the Government in preparing an Implementation Plan for a Strategic Intercity Motorway Network utilizing PPP. The final output of the implementation plan will be a detailed and coordinated scheme in the form of financial and implementation sub-plans utilizing the appropriate PPP covering one selected motorway, Bang Yai to Kanchanaburi, from the original five study corridors radiating out from Bangkok. The objective is to have this motorway to Kanchanaburi operational by 2018.

67. Under the GMS Highway Expansion Project a 73 km section of Highway 359 along the SC between Phanom Sarakham and Sa Kaeo will be upgraded to a 4-lane highway. This will then complete a continuous series of 4-lane divided and/or motorway standard roads along the SC between Bangkok and Aranyaprathet, to within about 1 km of the Cambodia border.

68. There is severe congestion on the roads (Thailand Highway 33 and Cambodia Route 5) within the border towns of Aranyaprathet and Poipet and at the border crossing proper. This has been a bottleneck for a number of years and will only get worse as time goes on. This is the busiest border crossing between Thailand and Cambodia and will remain so in the future. In the past this crossing acted for both highway and rail traffic, but for the last approximate 45 years the rail line has been severed at the border and the crossing has only served highway traffic. The highly congested areas surrounding the border crossing facilities have suffered from decades of poor urban and transport planning. The congestion has been greatly compounded by the construction (approximately 5-7 years ago) of a number of mid-rise gambling casinos/hotels and other commercial development scattered in and around the border crossing facilities and are adjacent to the border on the Cambodian side of the demarcation line. The result is a severely dysfunctional border crossing with no readily available options at the existing location to improve the operational characteristics and efficiency of the cross-border transport of goods and people (or the eventual restoration of an efficient railway connection).

69. The need for a bypass at this critical border crossing has been known for a number of years and discussions between the two countries, often with ADB acting as the honest broker, have been off and on for a decade\textsuperscript{32}. Two (2) possible bypasses alignments have previously been considered: a Southern Bypass, at one time suggested by the Cambodian Government, but never seriously considered by Thailand because of the very high cost and resettlement/refugee problems on the Thai side and a Northern Bypass that has long been

\textsuperscript{30} In November 2010 Italian-Thai Development announced that on November 2 it had signed the Framework Agreement with the Myanmar Port Authority, Ministry of Transport of the Union of Myanmar to develop the Dawei Deep Sea Port, Industrial Estate and Road Link to Thailand.

\textsuperscript{31} Consulting Services for Technical Assistance on Implementation Plan for Strategic Intercity Motorway Network Project.

\textsuperscript{32} With the change in government in Thailand in 2011, it can be contemplated that the time may be at hand where both countries can now agree on a solution to this issue.
under consideration by both governments which physically offers the best course of action; but as time goes on and new construction proceeds on both sides of the border, an economically and technically feasible alignment for this bypass may disappear. [The issues concerned with railway line relocation at this border crossing are more complex and would require considerable study, but if the issue of an improved road border crossing were to be studied, then it would seem that the improvement of a future railway crossing should also be included in the discussions].

70. In Cambodia along Route 5 to Sisophon and to Phnom Penh road sections have been improved through a series of projects financed by the Government, with assistance from ADB, OPEC and Australia. There are no serious gaps or bottlenecks along this section of the SC (Central Subcorridor) until reaching the urbanized outskirts of Phnom Penh.

71. Phnom Penh is at the crossing of two major trade/transport corridors, the Southern and Central Corridors. Most road sections leading to Phnom Penh have already been upgraded: i.e. along the SC along Highway 1 to the southeast connecting to Ho Chi Minh City and Highways 5 and 6 to the northwest to Sisophon and onwards to Thailand and along the CC on Highway 4 to the southwest to Sihanoukville and to the north along Highways 6 and 7 to Lao PDR. The Phnom Penh municipal government and the national government are keenly aware of the need for one or more bypasses/ring roads around Phnom Penh.

72. In 2007 JICA and the Cambodia Ministry of Public Works and Transport agreed to study an outer ring road for Phnom Penh. From this original 2007 agreement JICA prepared a: Preparation Study for Development Study, dated in 2010, which consisted of a relatively short (about 10 page) brief/outline of a proposed master plan study to be carried out. Now 5 years later real progress on this outer ring road seems slow to materialize in any measureable way. It is clear any such bypass/ring road will necessarily encounter environmental and resettlement issues, but to do nothing until it is too late may not be a viable option.

73. On the Phnom Penh city government web page the Government indicates an outer ring road in their overall city road planning, although the outer ring road indicated by the city government is somewhat different from the JICA initial plan. The city government envisions a series of ‘partial’ ring roads: an Inner Ring Road and an Intermediate Ring Road, apparently following new arterial road/street networks and an Outer Ring Road planned to be a controlled access expressway facility.

74. In 2009 the Economic Research Institute for ASEAN and East Asia (ERIA) Mekong-India Economic Corridor, Development Concept Paper proposed the construction of bypasses with access control around Phnom Penh City as a major priority along the Southern Corridor. Rather than focus initially on an outer ring road that would necessarily have to deal with multiple crossings of the Tonle Sap, Bassac and Mekong Rivers, it might be prudent to initially only

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33 A stumbling point in the past concerning the Northern Bypass is that there is a “no-man’s land” of a few hundred meters that would either have to be resolved, or more likely, building a “no-man’s corridor” into the new border crossing.


35 Dated July 2010 according to the JICA webpage: <http://www.jica.go.jp/english/operations/social_environmental/archive/pro.asia/pdf/cambodia12_02.pdf>

36 www.phnompenh.gov.kh

37 This concept paper estimated the need for 44km of bypass expressway, with an estimated cost $90 million.
focus on the most important linkages: an expressway bypass interconnecting Routes 5, 4, 3 and 1, all lying to the west of these three major rivers, and at some later date this expressway could be extended across these major rivers to complete the expressway ring road.

75. From Phnom Penh to the Viet Nam border the SC (Central Subcorridor), the initial section of road (along Route 1) to Neak Luong at the Mekong River is a congested road in need of periodic maintenance/upgrading. The new Mekong River Bridge crossing at Neak Luong is under implementation with assistance from Japan and the next section of Route 1 from Neak Luong to Bavet (at the Viet Nam border) has been upgraded with assistance from the ADB.

76. The Bavet/Moc Bai border crossing is the most active crossing between Cambodia and Viet Nam; border crossing facilities having been upgraded under financing by ADB in 2003-2005. In Viet Nam 80 km of the SC (Central Subcorridor) along Highways 22 and 7 was upgraded by the ADB about 7 years ago. The Viet Nam MOT has future plans to again upgrade this corridor to expressway standard with a connection to the Third HCMC Ring Road\(^{38}\), which is now under construction with assistance from the ADB.

77. The SC (Northern Subcorridor) branches to the north away from the Central Subcorridor at Sisophon along Route 6. From Sisophon to Siam Reap the road has been recently upgraded with ADB assistance. After Siam Reap the Northern Subcorridor as envisioned in the GMS-TSS (2006) was to be along a new corridor from Siem Reap to Stung Treng. This section has never been implemented and is unlikely to be implemented in the foreseeable future. Cambodia requested this road section for ADB financing, but the estimated cost was extremely high and the new route would have severe environmental impacts at it passes through a jungle trail. It is not presently a priority project in the ADB program\(^{39}\). There has been some past interest by PRC and Japan to study this new route, but little has materialized. From a GMS corridor planning perspective the absence of this Siem Reap to Stung Treng road is a significant gap in the transport corridor network, but from a trade facilitation perspective this Northern Subcorridor of the SC is of little importance as compared to the Southern Subcorridor of the SC connecting Phnom Penh and Ho Chi Minh City.

78. The narrow road from Stung Treng to Le Tranh at the Viet Nam border (Route 19) is in fair condition and provides good connectivity between northeast Cambodia and Pleiku and to the Tum Plateau area of Viet Nam, but it is not a primary trade route and is only important for localized cross border trading. From the Viet Nam border to Pleiku (Highway 19) is a narrow road, but beyond Pleiku to Quy Nhon on the coast the road widens and serves as a main national route connecting Highway 1 traffic with communities in the western highlands of Viet Nam.

\(^{38}\) The Third HCMC Ring Road, when completed will be a controlled access facility and be the primary bypass of HCMC for through truck traffic and traffic to and from the HCMC complex of port facilities. The First and Second Ring Roads are primarily composed of a network of arterial streets; and the future Fourth Ring Road to be implemented with Government funding will primarily be a wide multi-lane, non-controlled access roadway for local traffic.

\(^{39}\) With all of this in mind the ADB in the future should reconsider presenting the SC as two subcorridors to the east of Sisophon and only present the SC as one corridor following the Central Subcorridor.
### Table 2.6: SC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Myanmar</th>
<th>Thailand</th>
<th>Cambodia</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
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<tr>
<td></td>
<td>As part of the Dawei Deep Sea Port and Special Economic Zone Project, the road from the port of Dawei to Kanchanaburi (Thailand) along the SC will be upgraded.</td>
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<tr>
<td></td>
<td>ADB TA is assisting in preparing a financial plan for the motorway from Bangkok to Kanchanaburi; opening expected in 2018. Under the GMS Highway Expansion Project the Phnom Sarakham - Sa Kaeo will be upgraded to a 4-lane highway to complete motorway/4-lane divided highway to Aranyaprathet.</td>
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<tr>
<td></td>
<td>Central Subcorridor</td>
<td></td>
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<tr>
<td></td>
<td>Road sections from m Poipet to Phnom Penh have been upgraded (Rte. 5). From Phnom Penh to Bavet are being upgraded with Japan assistance, including a new Mekong River Bridge at Neak Luong.</td>
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<tr>
<td></td>
<td>From the Viet Nam border to Pleiku (Highway 19) is a narrow road, but beyond Pleiku to Quy Nhon (on the coast) the road widens and serves as a main national route connecting Highway 1 traffic with communities in the western highlands of Viet Nam.</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5. Southern Coastal Corridor (SCC)

79. The Southern Coastal Corridor is an important corridor in terms of the coastal areas of Cambodia, the Mekong Delta area of Viet Nam and the Eastern Seaboard area of Thailand, but in terms of traffic generation and trade facilitation between the three countries it is a relatively minor corridor and will likely remain so for the foreseeable future.
80. The SCC through Thailand follows the coastal alignment of Highway 3 (Sukumvit Road) from Bangkok – Samut Prakan – Chonburi – Sattahip – Trat – Hat Let (at the Cambodia border), which is not a logical corridor in Thailand. A more logical alignment of the corridor would be: Bangkok – Chonburi – Laem Chabang – Pattaya along Highway 7, i.e. the Bangkok – Chonburi Motorway; then along Highway 36 from Pattaya to Rayong; which would be through the heart of the Eastern Seaboard Development area and connecting to the ports of Laem Chabang and Ma Tha Phut. It would then follow the original SCC corridor alignment along Highway 3 to Trat and Highway 318 to Hat Lek. Based on this alignment the corridor from Bangkok to Trat would follow the most upgraded coastal routes. The 82 km Highway 318 from Trad to Hat Lek was upgraded in 2011 to 4-lane divided highway to the Cambodia border.

81. The only congested sections of the SCC in Thailand are the lack of highway capacity along the extension of Highway 7 and along Highway 3 connecting to the port of Laem Chabang. The DOH is continually upgrading the road sections leading to Laem Chabang, but the upgrading of access roadways has always lagged behind the expansion of port facilities; with new highway widening and overpass construction always reacting to port expansion, rather than there being coordinated transport planning.

82. From Cham Yeam at the Thai border, through Koh King City to Sre Ambel (Route 48) the SCC has undergone major upgrading, including extensive sections of reconstruction of road sections and bridges. This has been funded by Thai grant aid. From Sre Ambel to Prek Chak to Kompol and to the Viet Nam border (Routes 4 and 33) all road sections have been or are in the process of being upgraded with United States/World Bank/Korea aid and more recently with ADB assistance under the GMS Southern Coastal Corridor Project. The upgrading of the border crossing facilities at Prek Chak/Ha Tien will be implemented under the GMS Southern Coastal Corridor Project (Additional Funding).

83. In Viet Nam, from Ha Tiem, the SCC will undergo major upgrading along Highway 80 to Rach Gia, under the GMS Southern Coastal Corridor Project (Additional Funding), including the construction of a number of bypasses of urbanized congested areas, with controlled access along some sections of the bypasses. From Rach Gia to Ca Mau and to Nam Can at the southern tip of the Mekong Delta region, the road sections have been upgraded, or are under construction, primarily with ADB financial assistance.

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Thailand</th>
<th>Cambodia</th>
<th>Viet Nam</th>
</tr>
</thead>
</table>
6. Central Corridor (CC)

84. The Central Corridor was not one of the original three corridors identified in the GMS Transport Master Plan (1995), but as it has developed over the years and is now one of the major transport corridors in the GMS. The CC is composed of major road links in three GMS countries: (i) in Lao PDR it follows the most important and most heavily traveled highway route in the country, Highway 13N (from Vientiane north) and 13S (from Vientiane south) stretching from the PRC border at Boten and connecting the four major cities of the country: Luang Prabang, Vientiane, Savannakhet and Pakse; (ii) in Thailand it follows Highway 2 from Nong Khai at the Lao PDR border south through all the major cities of the Northeast Region (Udon Thani, Khon Kaen and Nakhon Ratchasima) and along Highways 304/331 to reach the major port of Laem Chabang; and (iii) in Cambodia it is the only major north-south link in the country along Route 7 to Phnom Penh, then along Route 4 to Sihanoukville.

85. The primary highway arterial highway in Lao PDR, Highway 13N/13S was upgraded over a period of about 12 years from the mid-1990s to the mid-2000s, primarily under a series of ADB and World Bank assisted projects. It is now possible to drive the entire 1,500 km on a paved all-weather road from Boten at the PRC border to Veunekham at the Cambodia border. At the ancient royal capital of Luang Prabang to two major corridors, the NEC and the CC cross, together with the intersection of both corridors with the Mekong River. It is just a matter of time until the roads leading to and from Luang Prabang creates a land transport bottleneck. The city and national governments are aware of the issue and will need to be proactive in devising appropriate bypasses around the city to prevent the inevitable bottleneck from occurring. There are already a number of bypasses recently constructed to the north of Vientiane and others planned that should, at least for the immediate future, avoid through traffic congestion in the capital city. A bypass of Savannakhet at the intersection of the EWC (Highway 9) and the CC (Highway 13S) has already been constructed, as has a short bypass of the center of Pakse farther south in Champasak Province.

86. In Thailand the CC follows Highway 2 from Nong Khai at the Lao PDR border south through all the major cities of the Northeast ("Issan") Region, passing Udon Thani, Khon Kaen and Nakhon Ratchasima all with bypasses of their central urbanized areas. Although the road is not controlled access standard, all sections are either 4-lane or 6-lane divided highways with grade separated interchanges at most intersections with intersecting major highways. After Nakhon Ratchasima ("Korat") the CC follows Highway 304 south as a 4-lane divided highway crossing the SC along Highway 359, which is presently being implemented by under the ADB Highway Expansion Project. There is no interchange or grade separation at the crossing, but one is planned by the DOH once it is warranted by increased traffic. The designated southern terminus of the CC is Sattahip, a Thai Navy port facility, which is not a logical terminus of the CC. For the purposes of this assessment it is assumed that just before reaching Sattahip the CC turns to the west along Highway 331 connecting to Highway 7 and eventually terminates at the Port of Laem Chabang.

87. From the Lao PDR/Cambodian border at Don Kralor/Trapeng Kreal the CC follows Route 7 and Route 6 to Phnom Penh and then along Route 4 to Sihanoukville. This entire route has been upgraded in recent years except for the section through the urbanize area of Phnom

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40 UNESCO in 1995 designed the town of Luang Prabang as a World Heritage site as it represents to an exceptional extent, the successful fusion of the traditional architectural and urban structures and those of the European colonial rulers of the 19th and 20th centuries. Its unique townscape is remarkably well preserved, illustrating a key stage in the blending of two distinct cultural traditions.
Penh. A discussion on the need for a bypass and/or ring road of Phnom Penh is contained in the SC assessment.

Table 2.8: CC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>PRC</th>
<th>Lao PDR</th>
<th>Cambodia</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central (CC)</td>
<td>Kunming to Vientiane to Lao PDR Border followed by the NSC</td>
<td>Boten – Vientiane – Pakse – Cambodia Border</td>
<td>Lao PDR Border – Phnom Penh – Kao Ang [then SCC to Sihanoukville]</td>
<td>Hwy. 13S/13N upgraded, all-weather roadway from PRC border to Cambodia border.</td>
<td>(CC) THA: Nong Khai – Nakhon Ratchasima – Laem Chabang</td>
</tr>
</tbody>
</table>

Table 2.9: NC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Myanmar</th>
<th>PRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern (NC)</td>
<td>Tamu to Fangcheng</td>
<td>Tamu – Mandalay – Muse</td>
<td>Longdao – Kunming – Nanning - Fangcheng</td>
</tr>
</tbody>
</table>

7. The Northern Corridor (NC)

The Northern Corridor is primarily an east-west link located along the breadth of Yunnan Province from the Gulf of Tonkin on the east and traversing northern Myanmar on the west before reaching the Indian border at Tamu. Through a series of PRC-funded and ADB assisted projects, the NC in the PRC has, for the most part been, or is being, upgraded to expressway standard. Based on present initial assessments it appears that the PRC is also adequately addressing potential bottlenecks near and around, the two major urban centers of Kunming and Nanning.

In Myanmar, along the NC, the 176 km Lashio – Muse Road (at the PRC border) has been upgraded to AH Class III and is being operated on a private BOT basis. The remaining section of road from Lashio to Mandalay along the NC is in fair condition but lacking periodic maintenance. From Mandalay to Monywa the road is also in fair condition, but from Monywa to the Indian border at Tamu the road is in need of upgrading. There are a number of roads in the north of Myanmar that have recently been upgraded through aid from PRC (Yunnan Province): including Momauk – Lweje Road (79 km); Kambitte – Warshau – Myitkyina Road (98 km); Myitkyina - Pansauk – Ledo Road (365 km); Namtee - Janine Road (140 km); Theindo – Chinshwehaw Road (106 km) and the Ruili (China) – Kyaukpyu (Myanmar) Road.
8. Western Corridor (WC)

90. The Western Corridor is entirely located in Myanmar, but has important connections to the EWC near Mawlamyine and to the NSC via a short connection through Thailand to Tak. It is not entirely clear why the original concept of the WC did not continue north along AH1 past Meiktila to Mandalay in order to connect to the NC. From a trade perspective and probably also from a transport planning aspect that would appear to have been the more desirable corridor alignment.

91. The Ministry of Transport in Myanmar has targeted seven national road sections for rehabilitation: Shwebo - Myitkyina Road (476 km), Thanphyuzayat – Ye – Dawie – Myeik - Kawtaung Road (934 km), Meiktila – Taunggyi – Loilem - Kyaingtong Road (677 km), Minbu – Ann - Sittwe Road (477 km), Monywa – Pale – Gangaw - Kalaymyo Road (311 km), Mandalay - Thabeikkyin – Tagaung - Bhamo Road (282 km) and the Monywa – Yargyi - Kalewa Road (186 km). One, Thanphyuzayat – Kawtaung Road (934 km) is in the south along the length of the narrow sliver of land east of the Bilauktaung Mountain range that separates Myanmar from Thailand and the other six are mostly in the north of the country supporting connecting routes to PRC. None of the proposed projects are along the WC.

92. It appears that the WC as initially conceived, north and to the west from Meiktila, through Chauk, Pakokku and Gangaw is not a primary transport corridor and unlikely to ever be a trade route. All trade routes as they develop in this northern part of Myanmar will undoubtedly pass through Mandalay and follow the alignment of the NC to Tamu. The most apparent gap along the WC is tied in with the extension of the EWC from Kawkareik to Payagyi on the WC. The initial project would likely be from Kawkareik to Eindu (EWC) and Eindu to Thaton (WC), a total distance of 134 km. Assessments of sections of the WC beyond Meiktila should be deferred until Myanmar transport officials are engaged as to the primary route to be upgraded between Mandalay and the Indian border.

### Table 2.10: WC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Myanmar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western (WC)</td>
<td>Tamu to Mawlamyine</td>
<td>Tamu – Naypyidaw – Mawlamyine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The most apparent gap along the WC is tied in with the extension of the EWC from Kawkareik to Payagyi on the WC. The initial project would likely be from Kawkareik to Eindu (EWC) and Eindu to Thaton (WC), a total distance of 134 km. Assessments of sections of the WC beyond Meiktila should be deferred until Myanmar transport officials are engaged as to the primary route to be upgraded between Mandalay and the Indian border.</td>
</tr>
</tbody>
</table>

9. Northeastern Corridor (NEC)

93. The Northeastern Corridor is not a particularly well-conceived corridor, particularly with respect to trade facilitation. In Thailand it is positioned between two main Thai road corridors: the NSC (Highway 1) and the Thai subcorridor section of the Central Corridor (Highway 2), with the NEC not aligned with any primary Thai highway route. It partially follows route 21 north from Saraburi, then route 203 north of Lom Sak and eventually ‘disappears’ just south of Dan Sai, at which point almost all traffic continues along route 203 to Loei. There is a remotely located border crossing at Tha Li (Thailand) and Mittaphab Bridge (Lao PDR) that serves local cross border traffic. There is 35 km gap in the primary Thai highway network before reaching the Lao PDR border at Tha Li. This is not considered a gap by the Thai DOH and improvement of the road(s) to the Lao PDR border at this location is not a DOH priority. This border crossing is at
the tip of the land mass of Lao PDR the projects into Thailand’s Loei Province. This border crossing is near the start of the Lao PDR, Northern Greater Mekong Subregion Transport Network Improvement Project which is presently being implemented with ADB grant assistance providing a sealed all-weather road to connect districts in central and southern Xaignabouri Province with the provincial capitals of Luang Prabang and Xaignabouri. The primary export trade in this area is localized agricultural exports (sugar and corn) from Lao contract farmers under contract to Thai farmers on the other side of the border.

94. At Luang Prabang two major corridors, the NEC and the CC cross, together with the intersection of both corridors with the Mekong River. This potential bottleneck is discussed in the Central Corridor assessment. The NEC has a major gap between Luang Prabang and the junction with NR 1C, near Nam Neun. Due to the very rugged terrain and sparse population and traffic in this mountainous area, it is not likely that this gap will ever be closed. Two alternate alignments that deviate from the NEC corridor will be used: (i) following NR 13 north of Luang Prabang and then NR 1C to the southeast; or (ii) south along NR13 from Luang Prabang and then east along NR 7, then back north on NR 6 to intersect NR 1C.

95. In the northeast region of Lao PDR and in Viet Nam, the on-going Second Northern GMS Transport Network Project has been designed to close some of the remaining gaps along the NEC, including the upgrading and reconstruction of 195 km in Viet Nam (Route QL217) and 144 km in Lao PDR (NR 6, NR6A and NR6B). The project will also include the reconstruction and/or repair of 30 bridge in Viet Nam and 32 bridges in Lao PDR.

Table 2.11: NEC Assessment Summary

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Termini</th>
<th>Viet Nam</th>
<th>Lao PDR</th>
<th>Thailand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast NEC</td>
<td>Thanh Hoa – Na Mea (at Lao PDR Border)</td>
<td>Nam Soy (at Viet Nam Border – Luang Prabang – Mittaphab Bridge (at Thai Border)</td>
<td>Tha Li (at Lao PDR Border) – Phetchabun – Saraburi Bangkok/Laem Chabang</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thanh Hoa to Bangkok/ Laem Chabang</td>
<td>No major gaps along the Viet Nam section after the completion of the Second Northern GMS Transport Network Project</td>
<td>Major gap in the corridor between Luang Prabang to the junction with NR 1C near Muang Hiam (Vieng Thong). Future road transport bottleneck will occur at Luang Prabang where two major corridors, the NEC and the CC cross and where both corridors cross the Mekong River.</td>
<td>North of Dan Sai there is about 35 km gap in the primary Thai highway network before reaching the Lao PDR border at Tha Li. This is not considered a gap by the Thai DOH and improvement of the road(s) to the Lao PDR border project is not a priority.</td>
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</tbody>
</table>
III. TRANSPORT SERVICES ASSESSMENT

96. This chapter provides an initial assessment of the structure, conduct, competitiveness and performance of the international freight transport market in the GMS area from a service provider perspective, as opposed to the more usual institutional standpoint. This change of approach is designed to assess the GMS transport infrastructure needs and priorities more from a user stakeholder dimension, particularly as the program is intended to embrace private sector involvement. In order to stimulate their interest it is important to understand their particular market environment and what their likely requirements are in enabling them to carry increased volumes of international trade more efficiently across the subregion.

97. Freight transport is principally a ‘demand responder’ in that it develops in response to the demands of its clients, whether the need is to convey traffic nationally or internationally. Transport in isolation is not a demand creator or even freight traffic generator, though improvements in transport can sometimes unlock latent demand and translate it into physical movements through enhancements in service offerings. The demand for trade logistics in the GMS is created and driven by the specific needs of respective trading communities, rather than the transport and logistics industry which is merely the service provider. Development of transport infrastructure in isolation will not act as a trade generator unless the demand is already there or exists in a latent form. Construction of transport infrastructure, hoping that demand will follow solely as a result of that development, represents a high risk strategy and has resulted in a number of unsuccessful projects, even within the GMS area. It is also clear that along some of the GMS corridors the original projected flows of international freight traffic have failed to materialize at the expected rate, partly because it was anticipated the transport industry would generate traffic based on better connectivity alone. Consequently more accurate demand profiling, as discussed in the previous chapter, is the key element in infrastructure planning and development, but due cognizance needs to be taken of the various parties who will be responsible for conveying that demand along the transport and economic corridors – the transport industry.

98. In the context of this report the primary demand is to move international freight traffic within GMS and to connect the subregion with its external trade markets using a variety of transport modes. Transport and logistics are two different modes, though interfacing subjects with transport relating to the physical conveyance of freight from point A to point B using a specific means of transport, whereas logistics relates to the overall movement of product from supplier to consumer, of which transport is only an element within the supply chain. Unfortunately, at institutional levels the terms have become almost interchangeable, whereas at operator level they have significantly different connotations. For this reason, this chapter examines transport and logistics is addressed separately in the next chapter, thus ensuring both institutional and service provider perspectives have been addressed.

A. Modal Competition

99. International and domestic transportation services are based on providing clients with the optimum service standard for the movement of their specific product. This standard consists of a balance between cost, speed/time and reliability, sometimes referred to as C/T/R service parameters. This balance tends to dictate the optimal mode of transport to be used, assuming a modal alternative is available and usually acts as a key product differentiator between the various service providers.
At the premium end of the market is the air transport mode which is fast and reliable, but expensive. Therefore, it is best suited for moving goods having a relatively high sale value capable of offsetting the high cost parameter. Research has shown that though speed is its primary attribute, often air transport is used in modern logistics merely because it is significantly faster than the maritime alternative for long distance movements. For example from Thailand to Europe it is common that flown goods are not actually needed in the 1-2 day timeframe which the service can provide, but are needed within perhaps 20 days and sea transport will take longer. Much of the airfreight moves sub-optimally in speed terms, often waiting for consolidation services to reduce the transport costs or incurring delayed collection from destination airports. Air transport is important in the GMS region given its import/export profile, especially for the movement fresh produce and higher value manufactures to distant markets in the US, Europe and Australasia – markets where there is a major time differential between air and sea transport. Generally air transport handles only about 1-2% or less of imports or exports by tonnage, though a slightly higher percentage by value.

Road transport is considered to be fast and relatively reliable, but is high cost compared to either rail or maritime modes. However, it is much more flexible as it does not require fixed facilities (other than use of public roads) and can provide door-to-door services using its speed and reliability elements to offset the higher costs. Both rail and maritime movements usually incur road transport costs at least at one end of the journey. Road transport is the most common mode used in trade logistics within the GMS either in isolation for movement of bilateral trade or more commonly in a complementary supporting role to maritime transport. Indeed, in overall trade logistics terms the primary function of road transport in the subregion is to distribute imports and exports to and from the ports. In tonnage terms this activity far exceeds road traffic physically crossing the GMS borders.

The final transport mode is inland water transport which is cheaper, but slower and not always reliable. These parameters mean it is particularly suitable for the movement of basic low value cargoes such as aggregates and with its economies of scale for carrying high volume shipments such as fuel, rice, construction materials etc. Given the low cost of most transported items, the additional inventory costs incurred as a result of the slow transit are more than offset by the low costs of carriage. Inland waterways transport is generally competing with the land transport market and would normally be an alternative to rail, given their synergy of C/T/R service parameters. However, due to the lack of a comprehensive rail network in the subregion, inland waterways in the GMS area are mainly competing with the more expensive road mode, though their penetration of the international trade sector is considered to be relatively minimal and related to narrow range of commodities (other than shipping services using the Mekong River up to Phnom Penh).

Despite institutional discussions on the importance of modal competition on the GMS multimodal corridors, the reality is that modal competition generally is quite limited. This is because the type of goods, its origin and destination and client demands, mean the service needs in terms of C/T/R requirements usually indicate a clear optimal mode of transport to be used. In many cases there is only one mode or combination of modes realistically available. Indeed, in the majority of cases the modes tend to complement each other rather than compete, such as road being the collection and distribution for much of the maritime traffic. While there is a degree of potential modal overlap in the C/T/R balance, the proportion of trade movements whereby use of one mode of transport or another (other than in combination with each other) is a real option is small. The modal service standards in terms of C/T/R for the different modes relative to each other are shown diagrammatically in Figure 3.1.
Thus, in practice when assessing transport competitiveness for trade logistics in the GMS area this tends to be mainly within a particular mode rather than necessarily between modes. It is recognized that developing multimodal corridors in the GMS region should theoretically promote competition between modes, but as indicated the C/T/R balances will continue to result in one mode being dominant over the other on a particular route for a certain type of product, even when such modal alternatives exist. In relation to intra-subregional trade logistics in the GMS area appreciable enhancement of the transport infrastructure could potentially result in some modal transfer of goods from maritime to either rail or road. However, the longer the distance the less likely the incidence of such modal transfers due to the substantial differences in unit costs of carriage between the maritime and surface modes. The primary effect of transport infrastructure development is most likely to be enhancement of competition within a particular mode rather than one mode relative to another.

B. Air Transport

104. Air transport in GMS is considered to be of growing importance in the movement of its external trade, but with relatively minimal penetration of the intra-GMS market. The primary driving forces in the world airfreight market are growth in wealth, increased demand for the movement of fresh produce, the production of higher value manufactured products and dispersed production and assembly systems. Overall growth in GDP inevitably leads to development of a social environment with increased spending power which is more demanding in terms of both product choice and its immediate availability. This in turn generates demand for faster movement between the point of production and consumption for higher valued products for which air transport is well placed to meet. Examples of such traffic includes fresh fruit and vegetables, fish and crustaceans, flowers etc. that have a shorter shelf life, fashion items, such as designer goods which are seasonal, urgent medical products etc. Other primary sources of air freight are spare parts, complex manufactured goods and parcel traffic which have a high intrinsic value or need the speed element to minimize inventory costs or ensure security of supply. Increased production of higher value more complex industrial products such as electrical goods, auto-parts, computers, cameras etc. in the GMS area will mean the likelihood of small inventories travelling by air will continue to increase. New logistical systems developed
to support dispersed assembly production techniques will also generate demand for the urgent transportation of goods between production lines.

105. The profile of the GMS suggests airfreight growth in the subregion could be above current world average of around 4% per annum and may be closer to 8% annual growth experienced prior to the global financial crisis. The higher than average growth in GDP in the subregion also suggests a rapidly growing middle class with increased spending power which could fuel import demand for airfreight-type products. The subregion is already active in the export production of fresh produce, clothing and electrical goods that is being transported by air. Rising labor costs will potentially lead towards manufacturing activity being increasingly focused on the production of higher value more complex products which are likely to move by air. The primary demand is expected to be long distance movements to or from the subregion where air is competing with the maritime mode. The main air freight routes are to/from Europe, NE Asia, North America and Australasia with only minimal volumes moving subregionally (other than as part of a longer distance movement). This is because the export products suitable for transport by air from the GMS are predominantly produced for the external market with only limited 'internal demand', though this sector could potentially increase as SE Asia develops.

106. The GMS region is well supplied with both air freight capacity and services. This is because most air freight is carried 'underbelly' in passenger aircraft and the subregion has a comprehensive passenger flight network. The major scheduled ‘network’ carriers operate ‘hub and spoke’ systems for both freight and passengers, though not all such carriers are necessarily freight-orientated. Thai Airways hubbing out of Bangkok is the only significant freight airline based within GMS, though other major Asian freight carriers have hubs nearby, such as Cathay (Hong Kong), Singapore Airlines (Singapore) Malaysian (Kuala Lumpur), China Southern (Guangzhou) and with JAL and Korean further away. These freight-oriented carriers have ‘spoke’ scheduled passenger flights to all the main airports in the GMS and these flights act as ‘feeders’ to their hubs.

107. Major airfreight generating airports, such as Bangkok, are also served on a spoke basis by all the major European and Middle Eastern carriers and some US carriers. Only Ho Chi Minh City, Ha Noi and Kunming appear potentially to be other air freight generating centers and each already has coverage by one or more of the major freight-oriented airlines on a spoke basis. Further fleet expansion programs by the network carriers using larger aircraft are expected to further increase underbelly capacity and this could potentially result in surplus freight capacity in the short term. Some carriers with all-freighter aircraft, such as Singapore Airlines are currently laying-up their all-freighter aircraft in anticipation, but these could be brought back if demand increased.

108. Despite this situation, the GMS region remains an important air cargo charter market. This is because of the imbalance between passenger and freight demand on certain routes resulting in a shortage in underbelly freight capacity. Thus, all-freighter aircraft are required to either supplement underbelly capacity or provide capacity on routes where passenger volumes are low. The GMS-US and GMS-Middle East routes in particular appear the most attractive for such carriers. A number of all-freighter aircraft are based in Bangkok and others can be chartered in as required.

109. The subregion is also relatively well served by the international express parcel sector, mainly through the use of underbelly space in scheduled passenger aircraft. This would be expected to change with a gradual increase in the use of dedicated parcel aircraft operating on a hub and spoke system in order that the service providers can offer fully integrated services.
Currently there are no parcel flight hubs of the major parcel/express carriers within the GMS region. The levels of demand and national licensing arrangements permitting access will tend to dictate the roll-out speed for such specialized services.

110. The rapid expansion in Low Cost Carriers (LCC) in the subregion, such as Air Asia, Nok Air, Tiger etc. is having a significant impact on the passenger market, but is expected to have a negligible effect on the freight sector, other than possibly in relation to potential runway congestion at some airports. The LCC operators rely on high aircraft utilization factors and this requires rapid ground handling turnaround times, thus there is insufficient time for cargo handling. As a result most LCC either do not offer any freight services or severely limit their freight carrying capacity.

111. With regard to infrastructure, the GMS has only one significant freight airport, which is Suvarnabhumi Airport in Bangkok. Kunming Airport is the only other ‘hub’ airport (China Eastern), but this principally relates to domestic services. The ‘secondary’ freight airports tend to be located in the capitals in each GMS country as they are the principle demand centers, though Ho Chi Minh Airport is the exception given its large population and trade activities. In many cases there is a need for further upgrading of cargo terminals and handling equipment, especially with the ever increasing usage of Unit Load Devices (ULDs) in wide-bodied aircraft. However, it is considered the private sector and airlines are generally well-placed to develop such facilities. The exception might be at secondary airports where capital funding may be required for such facilities which would then be operated on a concession basis.

C. Maritime Transport

112. Maritime transport is expected to remain the dominant transport mode for the movement of international trade in the GMS area, even for much of the intra-subregional trade. There are many reasons for this, but probably the most important is the concentration of both production and demand in the major trade GMS countries along their seaboards, combined with the dominance of trade with external markets whereby sea transport is essential.

113. Maritime unit costs of carriage ($ per ton km) are much lower than those of surface transport, mainly due to its ability to convey goods in large volumes per movement thus achieving economies of scale. These economies using larger vessels lead to transport costs that are nonlinear with distance. Large vessels are used for longer distances so that the marginal cost per ton km declines with distance allowing exporters to compete in distant markets with relatively little premium in terms of additional costs of delivery. This is important because other things being equal, larger SE Asian traders will often tend to favor the larger, more integrated markets of Europe and the US over the smaller markets less organized markets in Asia, even though they are closer.

114. In countries such as Cambodia, Myanmar, PRC, Thailand and Viet Nam the proportion of their international trade which passes through their land and air borders is relatively minimal compared to that sent by sea. Only in the landlocked country of Lao PDR does trade with neighbors using surface transport dominate, though in many cases these imports and exports are often routed through Thai ports. In assessing maritime transport in the GMS area it is necessary to firstly consider the Asian market as a whole and then the GMS subregion within that context.

115. In the maritime freight sector the main categories are liquid bulk, dry bulk, containers and general cargo. The liquid bulk market is one of the largest categories and is dominated by
oil-related cargoes. This cargo is expected to always move by sea, except for inland distribution. Asia sources almost all of its crude oil from the Middle East transporting it to refineries in the region, mainly using Very Large Crude Carriers (VLCC) and smaller numbers of Suezmax and Aframax tankers.\textsuperscript{41} Despite some internal production in Malaysia, Brunei, Indonesia, offshore Myanmar and India the regional reliance on Middle Eastern oil is likely to remain, resulting in major maritime movements throughout South and East Asia. This single source reliance means that Asia usually has to pay a $1-2 per barrel premium on its oil shipments.

116. With regard to the GMS region, maritime oil distribution patterns are unlikely to change significantly. Refining capacity in Viet Nam is expanding rapidly and this will continue to increase in order to reduce its past reliance on Singapore refining and enabling it to be a supplier of product to neighboring countries. Thailand will expand its refining capacity mainly by upgrading existing facilities and has already introduced offshore mooring buoys to increase the size of crude oil tankers it can accept. Most refined product will be for the domestic market, but with some limited export movements to Cambodia, Lao PDR and Myanmar as they have no processing capacity. PRC is increasing both its refining capacity and its ability to accept larger crude tankers, but none of this new capacity is within GMS.

117. There are refineries in most of the developed Asian countries, but others rely on supplies of products from these refineries which are distributed mainly in Handymax products carriers, normally with a capacity of around 30,000 tonnes. While Asia currently has at least 22 million barrels per day of refining capacity, a capacity shortage could be seen in the region as early as 2013, despite PRC increasing its refining capacity and recent expansions in Viet Nam. General refinery economics in Asia remain challenging with high construction and development costs ‘blowing out’ CAPEX requirements. Higher Gross Refining Margins (GRM) are needed to justify these high investment costs, but these increased GRM’s are not being reflected in the market place. This has seen many planned refinery investments mothballed, delayed, or cancelled entirely given their questionable feasibility. This situation would be expected to result in increased movements of larger products carriers from more distant locations where there is excess capacity in order to make up for the refining shortfall in the Asian region.

118. The dry bulk cargo sector is dominated by movements of coal, iron ore, bauxite and other mineral ores and cereals. The general trend has been an increase in the size of bulk carriers, especially over the longer distance routes where greater capacity equals lower costs per ton carried. However, this is countered by the draft limitations at the receiving ports in

\textsuperscript{41} VLCC carries 200-300,000 tonnes of oil cargo, Suezmax 120-200,000 tonnes and Aframax 80-120,000 tonnes.
particular and that such vessels are often not dedicated to a particular route. Overall there is expected to be only limited change in the trade logistics for these products. One potential exception could be that if cereal prices continue to rise more shipments could be containerized, especially on imbalanced routes where shipping lines offer ‘promotion’ rates to relocate units. This is mainly because importers will often purchase in smaller parcel sizes as prices rise.

119. The container sector represents the premium freight sector of the maritime mode handling an ever increasing percentage of general trade (as opposed to bulk cargoes) and is the most important in terms of trade logistics and its impact on surface transport infrastructure development. Containerization would be expected to even further dominate non-bulk trade logistics in the future. Average container ship sizes are expected to increase on many of the main sea routes, but there will be limiting factors such as traffic demand, draft and ship economics. Clearly the largest vessels will operate on the busiest routes where there is most demand. This is expected to remain the transpacific East Asia - Europe routes and East Asia – US routes which are currently dominated by the major carriers Maersk, MSC, CMA-CMB and COSCO etc. The largest vessels can carry 14,770 TEU and have a draft of 15.5 meters, but this limits their ability to enter many ports. There is anecdotal evidence to suggest these vessels may not get much larger due to the ratio between port time and steaming time adversely affecting their economics.

120. Average vessel size on the Europe-Far East trade route is highest, at about 7,400 TEU, with all carriers deploying ships of over 4,000 TEU capacity. Maersk Line being the leading player has a significantly high average vessel size of over 9,200 TEU. Similar sized vessels are on the East Asia – US route, but then there is a sharp fall with the average Far East-Middle East mother ship capacity being approximately 3,500 TEU and the Far East-South Asia route even lower, at about 2,500 TEU. Therefore, the busiest routes create the most demand and are serviced by the largest vessels, but outside these routes the vessel sizes drop significantly.

121. There are draft limitations in many ports in SE Asia, especially in the Bay of Bengal, Gulf of Thailand and Gulf of Tonkin which mean these large vessels cannot enter even if the demand were present. In addition there are many ports where the demand is insufficient to justify a direct call with a large containership, often referred to as a ‘mother’ ship or mainline vessel. The major container lines are unlikely to make a direct call at a port with a mainline vessel unless annual traffic from that location exceeds 400-500,000 TEU per year. The solution is to operate a hub and spoke network with these large vessels calling at the hubs only and smaller ‘feeder’ vessels servicing spoke ports which have restricted draft or limited demand. For example Cambodia and Myanmar are serviced solely by feeder vessels. There are no regional container
hubs in the GMS region, though they are concentrated close by at Singapore, Tanjung Pelepas, Port Klang, Hong Kong, Shenzhen and Colombo (as regards Myanmar traffic only).

122. While mainline vessels may increase in their average size per route, an increase in size over 15,000 TEU appears unlikely. The main increases in ship size are expected to be in feeder vessel sizes from around 750 - 1000 TEU such as those operating in the Bay of Bengal and Gulf of Tonkin to larger new vessels able to operate with lower drafts, in the 1000-1500 TEU range. This trend could mean the same or less ships, but more units handled per call. Container services are not expected to become appreciably faster, as increasing ship speeds has in the past proved unable to generate any significant gains. Many of the world’s large container ships are operating at their optimal fuel efficiency speed which is well below their top speed. The most important change in recent years has been improvements in reliability of the container services. This service parameter is particularly important in trade logistics as it enables customers to have improved management of their supply chains.

123. It is concluded that maritime transport will remain dominant with a slight increase in vessel sizes, but no major changes in the market leading to supply constraints on the sea legs. Indeed, the sector has shown its remarkable ability to adapt quickly to both temporary over or undersupply of tonnage. Thus, supply is unlikely to be a problem in the foreseeable future given the excess capacity currently in the system and the large number of ships on order for delivery within the next five years. At the present time charter rates are still falling due to oversupply in the current difficult economic climate.

124. The most likely constraints in the maritime mode will be those arising at the ports, particularly relating to the modal interfaces and in the hinterland distribution systems. This is expected to be most severe at the traditional ‘city’ ports where the port is located in the center of a city with resultant limited expansion capabilities. Generally container terminals require appreciable open backland areas adjacent to the quays and this is difficult to obtain at these locations. Good examples of this in the GMS are the Port of Bangkok and Saigon Port. Purpose-built ports where expansion is possible through reclamation such as at Laem Chabang and the hub ports of Hong Kong, Port Klang and Tanjung Pelepas in Malaysia and Shenzhen are examples of ‘new’ ports where major expansion is proving much easier.

125. In relation to the concept of corridor development and international trade it may be important to regard the ports as ‘gateways’ to such corridors. While the current GMS transport and economic corridors have not specifically adopted this ‘gateway’ concept, the reality is that many of these corridors have a port at one end and more importantly the amount of trade moving along those corridors invariably increases on those sections closest to such ‘gateway’ ports. Many of the GMS corridors connect key ports with their hinterland. Those corridors without a port generally have relatively minimal amounts of trade traffic, others connected to ‘secondary’ ports have some trade movements and those to the major ports have high volumes of heavy transport. Thus, there is a relationship between corridors and ports that perhaps needs to be acknowledged in planning corridor development.

126. While the GMS area has no container hub ports it has a number of major and secondary ports. Thailand as the largest trading country in GMS and has two major ports Laem Chabang and Bangkok, both of which are located on the North-South Corridor. Laem Chabang Port is at the northern end of the Gulf of Thailand and is probably the most important GMS port. The core reason for development of the main Thai deep sea port at Laem Chabang, was that being outside the river access to Bangkok it had a deeper draft, thus it could handle much larger vessels up to super Post Panammax size. The port has achieved one of the highest growth rates
in the world and currently handles almost 5 million TEU per annum and under Phase II its capacity is being doubled.

127. Two of the key development features of the port have been its positioning relative to the national road network and the industrial developments in its immediate hinterland. The main highway No 3 from Bangkok to Rayong and the parallel motorway, Highway No. 7, are adjacent and provide good connectivity with the national network. More importantly, it is possible to reach all parts of the country without entering the Bangkok metropolis by using the ring roads and thus avoiding some of the daytime heavy vehicle restrictions. The other aspect has been the development on a large industrial complex covering western Chonburi Province and near Rayong. This is to some extent a ‘chicken and egg’ scenario in that industry has gravitated towards the industrial sites close to the port because of the services of the port, but correspondingly the port itself has gained as a result of these developments. Despite its size Laem Chabang does not attract mainline vessels, mainly due to the deviation distance from the key Hong Kong-Singapore maritime corridor. It has direct services to/from East Asia due to the smaller ship sizes on that route but almost all westbound cargo to Europe, Middle East and South Asia is transshipped at one of the hubs outside the subregion. Most intra-GMS traffic will also transship, though there are some direct feeder connections to Cambodia and Viet Nam. Traffic for Myanmar mainly transships at either Singapore or Colombo.

128. Bangkok is a standard river port covering about 30 km of river between the city and the river mouth consisting of private wharves on both banks, midstream moorings for ship/barge transfers and a central port area located 25 km upstream near the city center. Compared to the new port of Laem Chabang, the Port of Bangkok is located much closer to the main cargo base of Thailand, but unfortunately is less productive and well-equipped. It is constrained in terms of terminal and yard space and there is severe congestion on the connecting roads to and from the port. Its main drawback is that it can physically accommodate only relatively small, shallow container ships up to a maximum of 172 meters in length and 8.5 meters draft, this being equivalent in most cases to an effective loading capacity of just 950-1000 TEU.

129. Since the opening of Laem Chabang in 1991, the Government has been trying to place a cap (one million TEU) on the number of containers handled at Bangkok, but without much success. In recent years the port’s facilities continue to work with volumes between 30% and 50% above the Government’s recommended limit. Because the port is located much closer to many importers’ and exporters’ processing and distribution facilities within the city boundaries, it is often preferred by shippers despite its operational and congestion problems. Bangkok is only serviced by feeder container ships, thus most container traffic is routed through hubs at the southern end of the Malaysian Peninsula or by Hong Kong/Shenzhen. However, some of the same feeder vessels also call at Sihanoukville and Saigon, thus enabling direct services. In the longer term Bangkok is likely to be relegated to being a secondary port.

130. The second most important port in the GMS is Saigon Port in Viet Nam located at the crossroads of the Eastern and Southern Corridors. The old Saigon Port was situated on what was the outskirts but is now the suburbs of Ho Chi Minh City. It is the largest and busiest port in Viet Nam, but its growth has been constrained due to it being a city port. Being in the middle of the busiest city of the country meant ground transportation to and from the port had to deal with major traffic congestion. In August 2006, the authorities officially announced that Saigon Port would be relocated to Cat Lai and Hiep Phuoc. This plan not only resolved the limited size, obsolete facilities and traffic issues, but was designed to increase efficiency as the new port complex is located conveniently among the region’s industrial parks and export processing zones of Ho Chi Minh City, Binh Duong, Dong Nai and Ba Ria – Vung Tau. The new deep-sea
port in Hiep Phuoc is designed to cater vessels of up to 50,000 dwt. In 2005, Cat Lai port also went through an expansion in which it was equipped with more modern equipment. Furthermore, Saigon Port is developing the Cai Mep port complex and Thi Vai International General Port to be able to receive vessels of up to 80,000 dwt. The Saigon New Port consists of the Tan Cang-South Do Son Deep-water Port and Cat Lai terminal which together handle the largest tonnages and most of the container traffic. These are the deep-water berths with a draft of 15 meters.

131. It can be seen that Saigon Port is in reality a collection of ports in the vicinity of Ho Chi Minh City, rather than a single concentrated facility. The Saigon Port complex handles approximately 42 million tons of cargo per annum including 5 million tons of domestic cargoes. Container traffic has risen rapidly to around 3.3 million TEU per annum with the development of the new container terminals. This increase and the presence of some major terminal operators suggests that Saigon Port could become increasingly important and attract mainline vessels, given the limited deviation from the Hong Kong - Singapore maritime corridor. This may develop to a point whereby it could potentially become a hub port for the subregion. Increased mainline ship calls should lead to more attractive rates and enhance the port’s role as a potential gateway to Cambodia, using a combination of the Southern Corridor and the Mekong link.

132. Hai Phong is the main port in northern Viet Nam and it also serves the Kunming - Lao Cai – Ha Noi – Hai Phong corridor. It is located on a spur off the Eastern Corridor. It has two main terminals, Hoang Dieu Terminal with 11 wharves and the Chua Ve Terminal with 5 wharves. The port currently handles around 16 million tonnes per annum, of which 5 million is domestic. Container throughput is expected to be approximately 1 million TEU in 2012. While theoretically the port can accept vessels up to 40,000 dwt, the reality is only vessels up to about 10,000 dwt call due to the limited draft. The main developments relate to further expansion of Dinh Vu Port (Phases II and III) which are scheduled to provide 5 new berths by the end of 2012. The channel depth from the pilot boarding position to the new Dinh Vu Port area is 7.3 meters as opposed to only 5.5 meters to Hoang Dieu and Chua Ve terminals. Thus the developments will enable larger ships to be accommodated, though Hai Phong is expected to remain a feeder ship port for the foreseeable future.

133. Da Nang is located in central Viet Nam on the East-West and Eastern Corridors. It is a relatively small port with only 10 wharves and an alongside depth of 7-10 meters. It currently handles approximately 3.3 million tonnes per year, including about 100,000 TEU. Similar to Hai Phong and the more southerly Que Nhon port at the end of the northern arm of the southerly corridor, Da Nang is expect to remain a feeder port due to the limited demand of its hinterland. This will restrict its attraction and there may potentially be increased pressure to send traffic down by road or rail to Saigon Port where more attractive rates could, in the future, be available if it becomes a hub port.

134. Fangcheng Port is located in Guangxi Autonomous Region on the Gulf of Tonkin and is the only PRC port in the GMS. Its hinterland includes the city of Nanning and Yunnan Province to the west using the Northern Corridor. Fangcheng Port is a deep-water harbor and is one of the 12 PRC hub ports. It has 35 berths, of which 21 can accommodate vessels more than 10,000 dwt and maximum design berthing capacity is 200,000 dwt. The port has an annual throughput capacity of 30 million tons, though the dedicated container berth handling capacity is only 200,000 TEU annually. It is principally a bulk handling complex with a dedicated mineral ore terminal capable of handling 200,000 dwt vessels and berths handling 50,000 -70,000 dwt bulk carriers, as well as an oil and LPG berth. There are plans during the Eleventh Five Plan
period to construct four more berths to accommodate 70,000-150,000 dwt vessels in order to
double the port’s overall handling capacity. There is rail connectivity via the Nanning -
Fangcheng railway and Litang - Qinzhou railway to the main PRC rail network. This
is particularly important in handling the bulk cargoes. It is noted the container traffic is relatively
small, suggesting that demand is either very limited or more likely that shipments are being
routed by other PRC ports further to the east. It also suggests that it is not a significant
competitor to Hai Phong for Kunming traffic, but that there may not be much Kunming traffic
being routed through either port.

135. Sihanoukville is the only international and commercial deep seaport of Cambodia and is
located in the Bay of Kompong Som in the Gulf of Thailand. Constructed in 1956 it became
operational in 1960 and after several expansions the port now has a total berth line of 1,030
meters comprising of 4 terminals. Total traffic is around 2.4 million tonnes per annum. While
the port handles a significant amount of bulk cargoes such as coal destined to PRC and imports
of fuel, its container throughput is only around 200,000 TEU per annum. It is serviced by feeder
vessels connecting with Hong Kong or Singapore. This profile suggests that trade traffic on its
main connection to its hinterland, the southern end of the Central Corridor, may be relatively
light.

136. The port of Yangon is the principal port of Myanmar handling 90% of its international
trade and is situated on the Yangon River. The port is accessible only to vessels of 167 meters
length overall drawing 9 meters draft having a maximum dwt of 15,000 tonnes. However,
downstream at Thilawa the accessibility is greater in that it can handle vessels up to 200 meters
length overall, 9.5 meters draught and 20,000 dwt. Currently the ports only handle about
200,000 TEU per annum given the restrictions on international trade. These volumes would
suggest relatively light trade-related traffic on the main transport corridors running to the north
(the Western Corridor), though the port handles around 12 million tonnes per annum due to the
large amounts of bulk and conventional cargo. Removal of sanctions at a later stage would
suggest that volumes could increase significantly, though not to a level sufficient for mother
ships to call even if draft were available.

137. There are a number of proposals to develop new deep sea ports in Myanmar. The first
is on the island of Maday in Kyaukphyu of Rakhine state, where 20 meter deep water is
available. It could theoretically handle 4,000 TEU vessels and would be built by a Myanmar
private company (Asia World) with the new port expected to serve trade between Myanmar and
India (Kolkata/Haldia) and Bangladesh (Chittagong). The port would be located on a road link
connecting with Kunming Province with Myanmar’s Sittwe through Mandalay. Under an
economic cooperation strategy between Myanmar, Cambodia, Laos and Thailand, a deep sea
port is also being planned at Dawei (Mayingyi Port). It is proposed that the port be developed
under a package that includes construction of a road link between Dawei and Kanchanaburi.
This port development is more of a support facility for a heavy industrial complex with projected
steel mills, petrochemical plants and an oil refinery. The first proposal appears highly
speculative and appears, at this stage, unlikely to proceed unless perhaps PRC were to fund
the developments. The latter has commenced, but is now meeting localized environmental
problems. It is unlikely either port will develop container services and the major carriers are
generally not supportive of such developments as it means extra ports of call.

138. When assessing the attraction of ports in relation to container traffic it is perhaps useful
to note that the minimum necessary level of demand to attract a mainline vessel to call is
around 500,000 TEU per annum and for feeder vessels about 100,000 TEU. Below this level it
will become increasingly difficult to attract regular competitive services. In general the major
container ships are looking at fewer (rather than more) ports of call in order that traffic is consolidated such that they can utilize their potential economies of scale. The traditional break bulk services were based on local access resulting in large numbers of small ports, but with the high fixed costs of these large vessels less more efficient ports is the priority with increased distance spacing between ports of call. There is a similar concentration in facilities with the major container terminal operators such as Hutchison and Dubai World usually not being interested in terminal concessions for facilities handling under 250,000 TEU per annum.

139. ADB has to date had low involvement in port infrastructure development under the GMS program. In the period up to April 2008 only 2% of the amount spent on transport projects had been allocated to the port sector. This consisted of $82 million on developments at Saigon Port (Loan 1354-VIE) and Fangcheng Port (Loan 1427-PRC). Since those projects it is understood that no further loans for port development in the subregion have taken place. There is sometimes a perception that the private sector is the primary source for port development and as a result public sector funding needs are minimal. Unfortunately, this is often not the case as in almost all cases the infrastructure – channel, breakwaters and quays - is usually publicly-funded but the superstructure such as equipment and buildings are often provided by the private sector under concession arrangements. This suggests the international funding institutions may still have an important role in port development, especially at the ‘secondary’ ports where concession agreements with the major operators are less likely, such as container handling facilities with throughputs under 200,000 TEU per annum.

D. Rail Transport

140. Rail transport tends to be an underutilized transport mode in the movement of international trade in the GMS. The principle reason for this situation is the limitations of the network, particularly in terms of its regional connectivity. In the center of GMS is Thailand which is only connected with Malaysia to the south. Myanmar to the west has no international connections. There is no operational rail network in Cambodia or Laos PDR, while Viet Nam is only connected in the north with PRC which has a different operating gauge. The reality is that apart from some movements between PRC and northern Vietnam the role of rail in trade logistics is mainly inland distribution of certain traffics from the seaports.

141. Thailand has 4,431 km of meter gauge railway tracks managed by the State Railway of Thailand. The four main lines are the Northern Line, which terminates in Chiang Mai, the Northeastern Line, which terminates at Udon Thani and the Lao border in Nong Khia Province, the Eastern Line, which terminates at the Cambodian border in Sa Kaeo Province and the Southern Line, which terminates at the Malaysian border in Yal and Narathiwat Provinces. Many of these lines are single track and therefore of restricted capacity. Indications are that only around 2% of freight transported in Thailand is carried by rail. The main trade logistics activity is the container shuttle service between Laem Chabang and Lat Krabang ICD (85 km). This has recently been double tracked to enable it to handle 1 million TEU per annum. There are ongoing plans to the double track the Southern Line all the way from Bangkok to the Malaysian border at Padang Besar at an estimated cost of $700 million.

142. PRC has a very comprehensive rail network. In the GMS the main rail link is the Nanning–Kunming Railway which is a single-track electrified line completed in 1997. It has a total length of 900 km, including the main line between Nanning and Kunming and a branch line to Hongguo. With regard to GMS connectivity there are two rail connections with Vietnam: the

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western Yunnan Viet Nam Railway from Kunming to Hai Phong and the eastern railway from Nanning to Ha Noi. The railway into Yunnan was a meter gauge line, the only such line to operate inside China though it may have since have been converted to standard gauge. Railway services along the Chinese portion of the route were suspended in 2002, when floods and landslides caused serious damage to the track. Railway access to Nanning is through the border at Dong Dang in Lang Son Province where cargo is transshipped due to the change of gauge.

143. Apart from these two rail links with PRC Viet Nam has no other international connections with its neighbors (Cambodia and Lao PDR). As part of plans established by ASEAN, two new railways are under consideration: one branch connecting Ho Chi Minh City to Phnom Penh and one connecting the North–South Railway to Thakhek in Lao PDR. The Vietnamese portion of the Phnom Penh railway would begin with a junction of the North - South Railway at Di An station and would end in Loc Ninh, Binh Phuoc Province, close to the Cambodian border, linking up with a similar project on the Cambodian side. According to the plan established by ASEAN, this stretch is scheduled for completion by 2020. The proposed railway into Laos would run between Vung Ang in Ha Tinh Province to connect with the North–South Railway at Tan Ap station in Quang Binh Province, then crossing through the Mu Gia Pass towards Thakhek. According to plans established by ASEAN, the line may then be extended via Thakhek all the way to Vientiane.

144. In Myanmar the railway network comprises of the major trunk lines of the Mandalay line from Yangon-Mandalay 617 km, the Myitkyna line 544 km, the Pyay line 258 km, the Mawlamyine line 287 km and 10 branch lines giving a total route length of 5,028 km and track length of 6,546 km. The majority of the network is single track other than double tracking on the Yangon Circular Line, between Yangon and Mandalay and between Danyingon and Hlawga. Myanmar Railways is striving to upgrade its rail network and construct new rail lines. Despite the progress made in extending the network and the amount of double track work, Myanmar Railways acknowledge the overall state of the rail network and the services provided are unsatisfactory. The network requires comprehensive upgrading of track to eliminate many of the track restrictions and increase the average running speeds of trains, the introduction of modern rolling stock and the provision on new automated signaling systems to replace the current three block systems. The financial constraints imposed on Myanmar Railways means that there is very limited potential or interest in developing international links until the problems of the national network are resolved. The main role of rail in trade logistics at this stage is servicing the seaport terminals.

145. The role of railways in trade logistics is often misunderstood by those outside the transport sector. Rail is not an all-purpose transport system and has fixed linkages where the track goes. It should not be seen as a direct competitor to road, but considered as the optimum transport mode under certain conditions for particular types of product. Rail is attractive for the movement of lower cost bulk cargoes and becomes increasingly competitive over longer distances, as its costs per km increase only slowly compared to road. It is often forgotten that not all rail customers are rail connected and therefore the goods will still have to be transshipped and delivered by road. This local road delivery tends to be the most costly as these short journeys have high fixed costs and low variable costs. While costs vary in different countries, rail is unlikely generally to be economic over distances of less than 300 km compared to road transport. Another constraint is the high cost of shunting, marshalling and maintaining
sidings. Wagon load traffic\textsuperscript{43} has been phased out in most developing countries as an uneconomic activity. In Asia many of the rail service providers still offer such services, but it is expected that over time this type of service will be suspended.

146. These factors clearly suggest that the primary demand for rail transport is for moving low value cargoes moving in volume (trainloads) over long distances or a combination of at least two of these. This is the market where rail is most competitive and can have an important role to play in trade logistics. Attempts to transfer cargo from road to rail that do not contain two out of three requirements will almost certainly require operating subsidies and are unlikely to attract user support. However, there are approaches that can be used to manipulate the requirements. An example is the use of block trains for container cargo between ports and inland container depots. While each container is a single shipment they can be consolidated into a single point-to-point dedicated trainload movement. Thus, it becomes a volume movement over a long distance and more importantly because of it being a dedicated movement it partially eliminates the speed and reliability disadvantages of rail versus road transport. Similarly, fuel shipments from the ports to refineries to the depots in the centers of demand are well suited to rail because they are low value (excluding duties and taxes) and move in volume/trainloads, even sometimes over shorter distances. In addition, for bulk fuel the low distribution costs are more important than speed or reliability.

147. Rail is occasionally used over significantly shorter distances, for example between ports and ICDs. While some of these are over 300 km from the port there are exceptions. Examples of this are between Laem Chabang and Lat Krabang ICD in Thailand which is only 85 km. In reality over these shorter distances pricing is based on undercutting the road competition. Rail has lost its distance advantages and therefore has to compensate by moving high volumes, such as by operating shuttle services. However, it is generally acknowledged that it will be very difficult for the rail operator to achieve an acceptable financial return over these short distances. In practice the operation can be justified because it directly supports the port by moving goods faster from the container yards than the road alternative.

148. A major concern in terms of trade logistics is the poor speed and reliability of much of the GMS railway systems. There are large amounts of single lines restricting numbers of train paths, speed restrictions due to poor track maintenance, shortages of locomotives and modern rolling stock especially flatbed container wagons, the low priority sometimes given to freight services relative to passenger trains, poor management etc. Many railways organizations seem to feel that being low cost (in terms of charges to users) is sufficient to not only retain existing traffic, but attract new customers. With the value of goods increasing there is more focus on efficiency in logistics meaning the service package C/T/R combination is gradually moving away from cost towards speed and reliability in particular. The result is that in many countries rail volumes are declining, rather than growing.

149. Another problem with railways in many Asian countries is the carriage of 40 ft. (12 m) containers. Such a unit takes up 2 TEU of space on a flatbed wagon and thus the rail operator charges for 2 TEU outbound and again later for the return. It can be much more expensive to send such units inland by rail than by road, which would incur only a single vehicle charge. The situation is compounded if there is a traffic imbalance as the cost of returning the empty unit by rail becomes prohibitive and therefore the shipping lines may not allow the unit to proceed

\textsuperscript{43} Traffic moving as a single consignment in a wagon to or from a specific location as opposed to a trainload of traffic from a single origin to a single destination.
inland. This is a significant problem in GMS where there are major traffic imbalances, particularly with Lao PDR and Cambodia.

150. The conclusion is that rail has an important role in trade logistics, but is quite specific in nature in terms of when it is a realistic modal choice. In expanding the GMS rail network it will be critical to ensure that there is sufficient latent demand of the right types of long distance cargo to justify expensive new track. This will be particularly important when examining funding for missing links, such as between Thailand and Cambodia and between Thailand and Laos. Effective demand profiling is critical in assessing the commercial viability of such connectivity.

151. More importantly rail may need to change its approach if it is to even retain traffic, let alone increase its market penetration. There may be some growth in ‘semi-captive’ bulk traffic, but it is difficult to foresee it becoming a major player in trade logistics offering the type of service package it currently has on offer. Many of the rail organizations are autocratic and awareness levels as to what the rail users appears limited. Most of the existing traffic is semi-captive because it is low value, travels in bulk and needs to travel long distance and the service package is heavily reliant on the cost component. Speed and reliability have not improved in recent years and anecdotal evidence indicates in many cases it has actually deteriorated due to track restrictions. This suggests that the priorities in rail infrastructure may be improvement to the quality of the existing network, rather than increasing its size and that infrastructure enhancement in isolation might not generate additional trade flows.

152. The greatest potential from a trade logistics dimension could be in the development of longer distance block trains running from the ports, mainly because the ports by their very nature represent a traffic consolidation point, thus they have volume. This suggests the rail priorities might be in port intermodal linkages, rather than in potentially lower volume intra-regional rail linkages.

E. Road Transport

153. The international road transport sector in the GMS is relatively undeveloped at this stage because of the lack of international agreements allowing vehicles from one country to transit in another. In this situation there is only limited international road transport activity with most intra-GMS movements being conducted using interfacing of the domestic systems through border transshipment. The GMS Cross Border Transport Agreement (CBTA) was designed in November 1999 to remove the barriers to through-transport services. This initiative has now been signed by all the GMS countries, but Myanmar, Thailand and Viet Nam have not fully ratified its annexes and protocols. Whilst there has been some piloting and individual cross-border arrangements, unrestricted through-transport remains an elusive goal. There are some Thai, PRC and Vietnamese trucks transiting in and through Lao PDR on CBTA and bilateral arrangements, but overall volumes are limited with most traffic being transshipped.

154. One of the key issues negatively effecting the implementation of the CBTA is the differing situation in the road transport markets in the various countries. PRC and Thailand have more advanced trucking sectors with large numbers of heavy transport vehicles, whereas Cambodia and Lao PDR are dominated by small rigid vehicles, with Viet Nam having a mixed sector in between. This profile is to a certain extent reflected in the differing axle loads with Lao PDR only having a 9.1 tonne axle load limit, whereas Cambodia, Myanmar, PRC and Viet Nam have a 10 tonne axle limit and Thailand an 11 tonne limit.
155. Given limited amount of international through-transport taking place, any assessment of the road transport sector is principally an assessment of the domestic markets, followed by an appraisal of its capacity to go international, if all the restrictions were to be lifted. The largest amount of road transport operations are in Thailand where it is estimated that 95\% of freight movements within Thailand are by road transport. In general the national profile is of large numbers of aging trucks with low quality owner-driver operations. Unfortunately, in market with large numbers of owner-drivers and the ever increasing capital costs of trucks, there is a tendency to extend the life of second-hand trucks and limit routine maintenance. The domestic road freight transport is considered to be highly competitive among these small operators and this leads to them carrying overweight loads using older and polluting truck fleets. However, on the positive side in the urban centers and particularly around the ports and along the eastern seaboard there are larger numbers of newer heavy transport vehicles with fleet operators. Given the generally higher quality of the road infrastructure heavy transport and fleet operations are becoming increasingly dominant and thus improving the overall quality of service especially on longer distance routes.

156. The situation is understood to be broadly similar in PRC, though no individual research in Yunnan Province and Guangxi Autonomous Region has been available. Approximately 74\% of freight in PRC is carried by road transport. In the Chinese road freight transport market, most enterprises own less than 50 vehicles with over 50\% of operators having 10 vehicles or less. Due to high capital and technical requirements, the numbers of heavy duty goods transport goods transport individual operators is gradually declining in favor of fleet operators. The composition of international truck fleets has also radically changed with a significant decline in the number of vehicles in favor of operating larger units. Given that both the GMS areas are predominantly agro-economic areas it would be anticipated that most local transport would be conducted by owner-drivers with smaller rigid units and that the long distance sector would be serviced more by fleet operators using heavy transport.

157. Viet Nam’s road transport sector is dominated by small transport entities that are generally operating with limited resources and skills and a high proportion of older vehicles. There are still a few ‘fleet’ operators in the road transport sector, though this is growing especially around the Ha Noi/Hai Phong and Ho Chi Minh City conurbations and for long-haul transport operations. Road haulage is still dominant but rail and coastal shipping have more significant market penetration than in other GMS countries. The situation in both Cambodia and Lao PDR is the dominance of owner-drivers with small rigid units which are poorly maintained and often overloaded. The nature of the road infrastructure as well as the axle limits often tends to limit the benefits of heavy transport.

44 ADB: Transport sector Assessment, Strategy and Road Map 2011
158. The situation in Myanmar is more difficult to assess. Interviews with transport users indicate that the road transport sector is divided between the ‘official’ sector which consists of government-approved operators and the ‘unofficial’ sector based largely on ethnic community networks. Most of the major movements tend to use the ‘official’ carriers, but much of the localized cross-border trade uses the unofficial channels. Traffic moving from Thailand for longer distance movement within Myanmar is being transferred to heavy transport at the border, though the vehicles often appear to be poorly maintained. However, more significant tonnages are being ‘conveyed’ across the border by other means and on-carried using the unofficial sector.

159. Clearly improvements in road infrastructure will lead to increased penetration of the transport market by heavy goods transport, which is able to offer lower unit transport costs, assuming the demand is present. This will tend to further promote the development of fleet operations which tend to be more efficient and of higher service quality. In general trade logistics will require a greater use of heavy transport, particularly servicing the ports. This is already taking place and is expected to continue at a faster rate than occurs in the wholly domestic transport market.

160. In a GMS context the key issue is if the remaining barriers to implementation of the CBTA were to be removed would this transform the market and in what way? It is expected that transport entities from the larger countries would tend to increase their market share of bilateral trade logistics with the smaller countries, as has happened in the CAREC and SASEC areas. This is because not only do the fleet operators in the larger countries have access to more suitable transport resources, but more importantly given the traffic imbalances the routing control of the dominant flow usually lies with the larger exporting country. For example, for the traffic between Thailand and Lao PDR or Cambodia there is more traffic ex-Thailand and the routing control which dictates the selection of transporter is with the Thai exporter who usually chooses a Thai operator. The Thai haulier travels to one of these countries and due to the lack of return loads will drop back into Thailand and pick up a domestic load to complete the round trip. Unfortunately, in many cases the Lao or Cambodian operator not only lacks the equipment to be competitive on the Thai roads but has major difficulties in round trip loading due to the lack of return loads which will drop back into Thailand and pick up a domestic load to complete the round trip. Unfortunately, in many cases the Lao or Cambodian operator not only lacks the equipment to be competitive on the Thai roads but has major difficulties in round trip loading because of the traffic imbalance. A similar situation exists in these two less developed countries for transport from either Vietnam or PRC. Already Thai, PRC and Vietnamese trucks are increasingly seen on Lao roads but not vice versa. There is often a natural tendency to try to limit such through-transport flows by the net importing country to ensure that at least their hauliers earn some revenue out of such movements, even though it may be costing the country more as a whole in terms of higher import prices.

161. Another problem is that until international through-transport becomes more established there is a residual fear of victimization, particularly from road authorities and police. Foreign vehicles ‘stand out’ in such an environment where they are not common. In both Central and South Asia where there are agreements allowing free access, the smaller countries tend to prefer to contract out their business to foreign truckers from larger neighboring countries rather than send their own vehicles because of the increased financial risks. Many owner-drivers consider that international transport operations do not generate sufficient fiscal benefits relative to the risks, so prefer to remain within the more stable domestic market.

162. Another barrier to through-transport agreements is the use of traditional terms of trade. In many cases the goods are sold ex-border or free delivered at the border. This means the exporter has no liability outside his country and the importer only becomes responsible when
the goods enter his country. In effect, the ownership of the goods changes at the border. Some countries, such as PRC, base much of their land border trade on such trading arrangements. The importer comes across the border, collects the goods from border warehouses and drives back to his country. In this situation where there is no inland collection or delivery there is no real potential for through-transport. At all PRC borders foreign road transporters cannot proceed beyond the nominated ‘border market’ location.

163. This should not infer that through- and transit-transport should not be encouraged. There are clear benefits in developing such systems in lowering overall trade transaction costs. The fact that there is growing through-transport activities despite the restrictions suggests there is significant latent demand for such services. The issues cited above merely indicate this is a complex situation with potential ‘winners and losers’ and hence full implementation of the CBTA is not an easy process. The overall effect of implementation would be expected to result in Thai, Chinese and Vietnamese transporting increasing amounts of their bilateral trade in Lao PDR and Cambodia and Thai and Chinese transporters travelling more in Myanmar. However, it is considered unlikely that either Thai or Vietnamese transporters will be permitted to enter PRC in the foreseeable future and the use of existing trading terms suggest there would be limited benefits in doing so.

164. Trade facilitation remains a key constraint for international road transport. Because of delays at the borders and the need for ‘facilitation payments’ to expedite performance, transport rates are higher than they should be as operators build such risks into their charges. Improvements in the trade facilitation environment tend to be slow due to vested interests and the need for changes in legislation to introduce changes in working practices. However, there have been noticeable improvements in some of the countries with the introduction of many of the recommendations of the Revised Kyoto Convention. Progress has been noticeable in the more developed GMS countries than in the less developed ones. Key requirements remain the more widespread customs application of risk management procedures to reduce border examination and inspection levels and better use of automated processing systems.

165. In terms of infrastructure international road transporters generally would like to see improvements in both roads and border operations along certain key trade corridors. However, the need is probably for fewer, but better performing routes rather than ever more crossings with variable performance. Fewer crossings/routes tend to ‘encourage’ consolidation of demand, thus making it easier to not only to market for traffic, but more importantly to improve programming in order to raise the level of return load ratios.

F. Inland Waterways Transport

166. GMS has an extensive network of inland waterways, of which the main route in terms of trade logistics is the Mekong River. In general, the inland waterways are used principally for passenger services and the localized domestic movement of lower value goods in bulk and agricultural produce, especially in low lying areas that are poorly connected by road. River transport is also used for barge/lighter traffic at a number of the main ports to convey goods between private wharves and seagoing vessels, such as at Bangkok, Saigon and Yangon ports. Direct movements of international trade tend to be confined to the upper reaches between northern Thailand and PRC, with river ports in both countries and in Lao PRD and Myanmar. By volume the main activity is at the southern end between Vietnam and Cambodia which is an international waterway. Records of trade movements along the waterway network are not readily available and it is noted that research into the use of the waterways within GMS as a conduit to intra-subregional trade has not been undertaken in any depth.
167. Of Thailand’s 6,000 km of waterway, approximately 30 per cent is capable of being navigated commercially, with a further 12 per cent reduction during the dry season. Inland navigation is mainly concentrated on four river systems: the Chao Phraya, Pasak, Tha Chin and Mae Klong systems. IWT is estimated to transport about 20 million tons of cargo annually, representing almost 5% of total inland cargo volume. During the rainy season about 1,600 km of waterways are navigable by barges of up to 80 tons with a 1.8 meter draft, which can travel from the Gulf of Thailand as far north as Uttaradit. Navigation is reduced to about 1,100 km in the dry season with traffic only able to navigate as far as Nakhon Sawan, approximately halfway to Uttaradit. In addition there are the inland waterway services in the north of the country on the upper reaches of the Mekong River. There are ports in Chiang Saen with a design capacity of 250,000 tons per annum and Chiang Kong with a design annual capacity of about 100,000 tons per annum. The private sector has also built some terminals along the Upper Mekong River in Chiang Rai Province. It has been indicated that the main bilateral traffic through these ports is with PRC with the distance between the two countries being only 60 km. Navigation is severely restricted in the dry season and indications are that shipping costs are quite high on this stretch of river.

168. While PRC has an extensive inland waterway system the only services in GMS relate to those in the upper Mekong bordering Lao PDR and Myanmar and running south into northern Thailand. PRC has upgraded three ports, Simao with a design capacity of 300,000 tons per annum, Jinghong with a design capacity of 100,000 tons per annum and Guanlei with a design capacity of 200,000 tons per annum. The river section within PRC has been improved for navigation of boats of 150 tons. Nine rapids and ten scattered reefs in the section bordering Lao PDR and Myanmar have been partially cut to open a safe channel for boats of 100 tons. Indications are that the main trade is with Thailand and Myanmar, but no data on traffic moving is available. It is noted all along the Mekong down as far as Mukdahan Chinese produce is much in evidence.

169. In Cambodia the extensive inland waterway system is important particularly with regard to movement of domestic traffic. The Mekong and Tonle Sap Rivers, their numerous tributaries provide 3,700 km of all year navigation for craft drawing 0.6 meters and another 282 km navigable to craft drawing 1.8 meters. In some areas, especially west of the Mekong River and north of the Tonle Sap River, the region is completely dependent on waterways for communication and transport of rice and other materials. For international trade the Mekong is the key water highway from the delta in Viet Nam through to the port of Phnom Penh. This international waterway can accept vessels up to 8,000 dwt.

170. Viet Nam' has the largest inland waterway system in the GMS with more than 2,360 rivers and canals with a total length of 42,000 km of which 11,000 km of inland waterway is being used commercially, mainly in the delta areas of Red River (2,500km) and Mekong Rivers (4,500 km). Waterways services in the north, mainly the Red and Thai Binh Rivers are adversely affected by hydrographic factors with the minimum width ranges from 30 - 60 meters while that of depth is 1.5 - 2 meters, with a difference in depth between the dry and rainy seasons of 5 - 7 meters. Waterways in the South, mainly the Cuu Long and Dong Nai rivers are better with a minimum width ranges from 30 - 100 meters with a depth range of 2.5 - 3 meters and a seasonal variation of only 2 - 5 meters. In spite of many limitations, waterway transport is still heavily used for the movements of aggregates, construction materials and other low value cargoes. Its role in trade logistics is considered to be relatively minimal, other than river movements to Cambodia along the Mekong and movements within the delta area to and from the seaport terminals. In the lower Mekong, Viet Nam has completed a large scale project with
the World Bank to improve two waterway routes from Ho Chi Minh City to Ca Mau and Kien Luong and upgraded Can Tho port. It is understood that feasibility studies have been undertaken to improve the access channel of the Bassac River to increase capacity to accommodate 10,000 dwt sea-going ships to handle the export of rice.

171. In Lao PDR the inland waterway network is confined to the Mekong River. Unfortunately, of the 1900 km in the country only 1300 km is navigable due to rapids and falling river levels during the dry season. Waterway transport does not play a significant role in trade logistics, other than limited localized cross-border trade across the river with Thailand and Chinese goods moving along the river as far down as Pakse. A new economic development zone has recently been completed near the Ban Mom River Port.

172. Myanmar has an extensive inland waterway network along the navigable waterways of the Ayeyarwady and Chindwin rivers as well as in Mon, Kayin and Rakhine states. These are all used for domestic transport, but with some movements to and from the seaports. In addition Myanmar has designated two ports for international traffic on the upper reaches of the Mekong River, Wan Seng and Wan Pong and has ports at Soploi and Jinghong. No data is available on the extent of the traffic movement along this stretch of the river, but indications are that most trade movements are with PRC.

G. Conclusions

173. This initial assessment of the transport services in the GMS highlights the following:

- Freight transport is a ‘demand responder’ not a demand creator or trade generator. Expecting transport in isolation to generate trade to support infrastructure development represents a high risk strategy;
- International and domestic transportation services are based on providing clients with the optimum service standard - a balance between cost, speed/time and reliability - for the movement of their specific product;
- Service standards usually dictate the optimal mode of transport to be used, assuming a modal alternative is available and act as a key product differentiator between the various service providers;
- Air freight tends, theoretically, to be competing with sea freight and road freight with rail freight but in reality modal competition is limited with only a small overlap. Most competition is within, rather than between modes;
- Demand for air freight transport in the GMS is growing, but the primary demand is for long-distance movements with only very small volumes of intra-GMS traffic. The subregion is well served by both network carriers and charter operators and sufficient service capacity is available. Airport infrastructure is sufficient though cargo facilities at some airports will require upgrading due to more unit load handling;
- Sea freight will remain the dominant international transit mode given the GMS reliance on external trade and the concentration of demand and production along the seaboards. The region is generally well served, but will continue to rely on feeder services with limited mainline vessel calls;
- The role of ports in trade logistics and in corridor development/prioritization may be easily underestimated. Consideration should be given to embracing ports as ‘gateways’
to GMS corridors given that the road sections closest to the ports tend to carry the highest volumes of trade traffic;

- International funding institutions still have an important role in port infrastructure development in the GMS, especially at secondary ports. Private sector investment is likely to be concentrated on port superstructure and equipment;

- Rail transport tends to be an underutilized transport mode in the movement of international trade in the GMS. The principle reason for this situation is the limitations of the network, particularly in terms of its regional connectivity with few international linkages;

- Rail organizations in the region generally have a poor comprehension of what type of traffic is best suited to their range of services and what potential users need – they lack customer-orientation. There is an overreliance on low freight charges as a method of retaining and attracting freight as opposed to offering improved, more reliable services possibly at a higher cost;

- Road transport accounts for most of the trade logistics in GMS. However, this is predominantly in support of the maritime mode as a collection and distribution service rather than as an international carrier. Cross border trade movement in the GMS are small compared to volumes through the ports;

- The road sector in many countries is dominated by owner-drivers and small operators with a few second-hand vehicles. There is a gradual increase in larger fleet operators with new heavy articulated transport units, especially around ports and major conurbations and performing international transport. These changes should result in improved service standards. Fleet modernization is required in all countries;

- Trade facilitation remains a key constraint for international road transport. Because of delays at the borders and the need for ‘facilitation payments’ to expedite performance, transport rates are higher than they should be as operators build such risks into their charges. Early resolution of these barriers appears unlikely, but should remain an important goal for the GMS initiative;

- International road transporters generally would like to see improvements in both roads and border operations along certain key trade corridors. However, the need is probably for fewer better performing linkages rather than ever more crossings with variable performance – focused development;

- GMS has an extensive network of inland waterways, of which the main route in terms of trade logistics is the Mekong River. In general, the inland waterways are used principally for passenger services and the localized domestic movements of lower value goods in bulk and agricultural produce; and

- The main use of inland water transport on the Mekong River is in the upper reaches for cross border trading activities and in the lower reaches connecting Phnom Penh with the sea and servicing Saigon port. The main problem for IWT is the variation in water levels which seriously restrict navigation in the dry season.
IV. ASSESSMENT OF LOGISTICS SERVICES IN GMS

174. In assessing the status and potential of logistics services in the GMS it is important to differentiate between transport services, as discussed in the previous chapter and logistics. A key problem relating to logistics has been the differing interpretations of the terminology between the institutional perception of logistics and those of the organizations actually operating within the marketplace. Decision makers in most countries have little understanding of the concept of logistics and how a logistics policy can be developed\textsuperscript{45}. In this report the terminology used is based on operator’s understanding as it will be those parties who will principally be driving the future development of the sector in the GMS area. They consider logistics as being the management of the overall movement of goods between the point of production and the point of consumption. It is an advanced form of physical distribution providing added-value services and has become more of a concept of ‘being a collection of services facilitating the economic transactions associated with production and trade’ addressing the whole supply chain. The supply-chain consists of a combination of services or ‘chain’ links delivering inputs from the supplier at the point of production to the final consumer. Advanced logistics seeks to maximize the extent of control/management along the supply-chain as shown in Figure 4.1.

**Figure 4.1: Logistics Supply Chain**

Source: Consultant

175. UNESCAP defines logistics\textsuperscript{46} and logistics management as ‘getting the right product to the right place in the right quantity at the right time, in the best condition and at an acceptable cost. It embraces purchasing and supplier management, materials management and manufacturing, inventory management and warehousing, distribution and transport and customer service\textsuperscript{47}. The objective of logistics management is therefore to optimize the costs of the supply chain, which includes storage, inventory control, distribution and transport. Assertive measures to improve the quality of a country’s logistics system will usually be rewarded with improved access to both national and international markets.

176. It can be seen logistics covers a series of different activities (links in the chain), sometimes referred to as added-value services and that transport is only one component within logistics, not logistics in itself. Unfortunately, despite the similarity in definitions indicated above many institutions often wrongly interchange terminologies, using logistics to describe either transport, transport infrastructure or both. This confusion is not limited to these organizations as transporters and forwarders often now refer to themselves as logistics providers or logistics

\textsuperscript{45} Logistics Development Study of the GMS North-South Economic Corridor
\textsuperscript{46} UNESCAP Regional Expert Group Meeting on the Development of Dry Ports along the Asian Highway and Trans-Asian Railway Networks Bangkok, 1-3 November 2010
\textsuperscript{47} UK Chartered Institute of Logistics and Transport
operators, when in reality they are only undertaking their traditional range of transport-related services and have merely used the word as part of a re-branding exercise in promoting/marketing their companies.

177. Trade logistics are simply a variant to the logistics concepts relating specifically to an international supply chain or the physical distribution (or collection) of goods within that chain. The goods themselves may be in international transit or can be a domestic activity which represents an extension of an international supply chain. Technically, trade logistics covers a much wider spectrum including funding of trade such as letters of credit, customs requirements, CIQS clearances, compliance with trade agreements etc. Trade and transport facilitation is designed to make international trading easier and thus promote trade, but is not trade logistics, though their effectiveness and efficiency impacts upon specific ‘links’ within an international supply chain.

178. The role of trade logistics and demand for logistical services in GMS should be viewed within the context of global trade competition. Reductions in transit times and transport costs now allow importers to select potential suppliers from a wider geographical area. As issues of quality assurance are addressed through production technology and procedures and production technology has allowed producers to adjust the mix of labor and capital to produce goods at competitive pricing ex-works, the selection of suppliers has become increasing based on delivered price and lead time\(^\text{48}\). Logistics services offering the optimum blend of cost, speed and reliability (C/T/R) between ex-works and delivered price are now a critical component in supplier selection, such as for example whether to purchase from the GMS area or from South Asia. The balance between cost, speed and reliability will differ per product with lower value products tending to be more price sensitive, whereas higher value products being more speed and reliability sensitive.

A. Global Development of Logistics

179. GMS is not an isolated region and is therefore subject to global trends. Thus, in assessing the current situation and identifying future growth, it is useful to initially examine trends in more advanced markets as they are likely to be increasingly replicated in developing markets like the GMS. The concept of global logistics has emerged gradually over the last 30 years. The essence of advanced logistical systems is that by spending more money on total logistics, this will yield benefits in terms of overall cost savings and getting goods to the market more rapidly, thus fulfilling ever-changing consumer preferences/demands. The optimal system balances the twin objectives of reducing overall costs while still providing an acceptable service. Such systems have grown in complexity in recent years, particularly as a result of developments in information technology.

180. Logistics is a service industry thus logistics is therefore ‘demand-driven’. The initial demand drivers for the evolution of the industry in many developed countries over 30 years ago were the major retailers, particularly in the supermarket/superstore sector. As net sales margins came under pressure and these retailers grew larger and more powerful, it became obvious if they could control more of the logistic activities (supply-chain) ‘upstream’ there could be significant financial benefits to be obtained in terms of both inventory levels and quality of service. A key issue they identified was the problem of the need to hold high levels of inventory at the point of sale, resulting in valuable retailing space being lost and storage was being undertaken at the most expensive location. It was therefore logical to consider holding

inventory at a point ‘further up’ the logistics chain. This led to the concept of developing central and regional warehousing systems, whereby the function of the regional warehouse was to hold inventory and supply just-in-time (JIT) movements of goods direct to the retail locations in response to restocking orders generated at the point of sale. The net effect of these changes was a major reduction in inventory costs for retailers. Wallmart of the US, one of the world biggest retailers, reduced their sales costs by 2-3% overall almost overnight by adopting such advanced logistics applications.

181. As the market gradually matured the same logistical techniques rapidly extended to a much larger range of service and industrial sectors. Larger manufacturers, in particular multinationals, were quick to identify they could make similar savings on their inventory by calling forward stock from their suppliers and sub-contractors on a JIT basis to meet production schedules, effectively forcing their suppliers to hold stock ‘upstream’ in their own warehouses. On the one hand this was a response to the pressures exerted on them by the retail sector and on the other hand it reflected the need to minimize capital tied up in both raw materials and finished stock. With further development the retailers and manufactures increased the range of activities within their supply-chain which they were prepared to outsource and advanced physical distribution progressed into logistics – supply-chain management.

182. Whilst initially this was almost exclusively a domestic activity, its potential benefits were soon realized by those sections of the retail sector and multinationals who were active in several countries. The growth in reliable container, aviation and international road services enabled the concept to spread to both developed and transition countries. Major retailers and multinationals have increasingly adopted region-wide or global logistics strategies. Implementation of such global strategies requires both capital and resources. The trend has been to outsource management of their international supply-chains to the larger Third Party Logistics Providers (3PLs), in the same manner they had done in the domestic sector.

183. Outsourcing is considered critical to the development of the logistics sector. The decision on whether it is appropriate for a company to use a third party, as opposed to in-house services, depends on a number of factors. Typically out-sourcing will provide economies of scale for medium/small manufacturers and permit larger manufactures to concentrate more on core activities, such as production and sales. It is estimated that approximately a third of logistics turnover is outsourced and contracted to 3PLs in developed logistics environments, such as the EU and the practice continues to grow. However, this is in sharp contrast to countries in much of Asia where outsourcing is expected to be well below 10% of trade-related transport services, as indicated later.

184. On the supply side, the physical distribution and logistics sector has had to respond to the initial demands of the retailing and then of the manufacturing sector. The two main elements of logistics services are transport and information technology, allied with inventory control and storage. Physical transportation remains an important component, thus many of the companies that now provide both domestic and international 3PL services, were formerly carriers (liner shipping companies and road hauliers/distribution companies) who now offer value-added logistics services, thus extending their service offerings along more of the supply chain. In general, the domestic distribution companies were the large road transport companies which diversified and developed enabling them to increase their involvement in the supply chain from solely the physical transportation to offering a more comprehensive logistics service, incorporating storage, inventory control and order-picking, thus becoming 3PLs.
185. A key aspect in relation to 3PLs is they are predominantly seeking to be integrated operators – to be the dominant service provider controlling all logistics activities from the point of delivery from the supplier through to the final point of retail or the end-user. The more sophisticated the supply chain, then the greater the degree of integration being sought. It is important to note that 3PLs are nearly always exclusively private sector operators, as the public sector normally lacks the appropriate level of customer-orientation and flexibility, which is essential to be considered as a ‘player’ in this market.

186. The major benefits of employing advanced logistics are savings in inventory levels, rather than in transport. Indeed, transport costs in the supply-chain will almost certainly increase due to the need for more expensive JIT distribution. Consequently, this type of concept is usually only applicable to higher value products where the release of capital tied up in stock is sufficient to more than compensate for the potential increase in transportation costs. Low value products are more price-sensitive and transport already represents a significant percentage of the retail value of the product, thus it cannot afford to pay any more and the savings in inventory capital would be relatively small given the low unit value of the product. Consequently, the physical distribution and logistics sector is principally concerned with the movement of higher value goods such as fast moving consumer goods (FMCG), rather than bulk movement of raw materials. Clearly all goods have a supply chain, but integrated management of that supply chain by a single party – logistics – tends to be concentrated on the ‘upper end of the market’ and therefore logistic is normally associated with this sector of the trading market.

187. This situation has significant modal implications. In the domestic sector the advanced distribution and logistics sector is almost exclusively road-based. This is because of the greater service reliability of this mode and the value of the product means that it can withstand the higher transport costs. Rail is sometimes used if the rail service has the appropriate reliability level, for example by means of scheduled overnight container block trains. However, in overall terms its market penetration is minimal unless the inland distances are large (500 km +). Use of domestic shipping and inland waterways in logistics is non-existent, other than to offshore islands. Basically, road is the dominant transport mode for the types of product likely to move through a modern domestic physical distribution and logistics system using 3PLs and thus quality road networks are essential.

188. In the international sector, there is the necessity to use slower bulk transport modes, such as maritime transport. However, this is almost always container shipping, which represents the premium end of the maritime sector. Major advances in container services mean that while door-to-door transit speeds have only reduced marginally in recent years, their reliability and quality of service has improved significantly. These latter aspects are critical in efficient international supply chains and logistics management where delivery lead times tend to dictate purchasing patterns. Advanced logistics also makes significant use of air freight, partly due to potential problems such as delayed vessels, strikes etc. Buffer stock, spares and samples are often sent by air so as to maintain the overall integrity of the supply chain, while for other types of product speed is critical such as fresh produce, flowers and even fashion goods.

189. The introduction of advanced logistics has enabled developed countries which have higher value products and costs to reduce logistics as a percentage of Gross Domestic Product (GDP) down from over 15% in the 1980’s to under 10% by 2005. It is estimated in the US that business logistics are equivalent to 8.6% of GDP, with transport accounting for 5.5% and inventory costs 3.1% with the costs as a percentage of GDP falling by nearly 30% for transport...
and over 50% for inventory\(^4\). Similarly in Japan the logistics as a percentage of product cost had fallen to 5.0% by 2004, of which 3.25% is transport and 1.75% is storage\(^5\). In Europe logistics costs are estimated to represent 10-15% of GDP\(^6\), whereas in China for example it is estimated to be 21.3% of GDP and evenly split between transport and inventory/storage\(^7\). Thus, it can be seen that developed countries have made reductions in logistics costs with major savings in reduced inventory/storage costs. However, Asia in general has lagged behind in logistics and not yet been able to reap the benefits seen in developed countries.

190. All of the above addresses the reasons for the evolution of logistics and how it is being responded to by the private sector as operators. This background to the sector is important in having a common understanding of what logistics is about prior to examining its application in GMS and its potential impact on infrastructure development. From an infrastructure ‘hardware’ perspective the most important aspect is a modern transport infrastructure. Those countries with the best and most comprehensive transport networks tend to be the most advanced in logistics. While it has been emphasized that logistics is not transport, it is acknowledged it is a vital component and without good roads, railways, seaports and airports the concept is difficult to realize. Given the importance of road transport as the prime transport mode in the domestic logistics market and its use within the international sector, a primary requirement is good road connectivity.

191. Physical distribution and logistics centers or logistics parks tend to be located at strategic transport nodes, usually close to junctions where major highways cross or a highway meets a city ring-road. The key parameters considered by 3PLs when seeking these optimum locations are market proximity, accessibility and land costs, as well as supporting planning approvals. Market proximity to areas of demand is critical as the distance between the stock or transit storage within the logistics facility and the end-users or points of final delivery should be as short as possible. This is because the final delivery is probably the most expensive transport component in the overall supply chain in terms of unit costs ($ per tonne km). Accessibility relates principally to connectivity using the national road network and its quality. The primary need is for high quality roads for the ‘line-haul’ – the longer distance transport between the initial ‘pick-up point’ and the logistics center. This is more critical than the shorter distance localized distribution which will always involve a mix of lower quality rural roads or more congested urban streets. In an international context, it is still the ‘line-haul’ connectivity that is critical, but with the seaport or major border crossings as the ‘pick-up point’.

B. **Overview of Current GMS Experience**

192. The profile of logistics development in the Asian region as a whole is very varied with the more developed countries having embraced the logistical concepts, while in others it only exists in a very basic form. For example Hong Kong, Japan, Korea and Singapore have world-class advanced logistical systems and the presence of many 3PLs and thus compare favorably with the EU and US, whereas many other Asian countries have low usage and only few major operators. Even in the more advanced GMS countries such Thailand while logistics is rapidly advancing its overall market penetration still remains relatively limited and PRC has yet to be significant users of advanced logistics in their domestic markets.

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\(^{5}\) Source: Japan Institute of Logistics Systems.

\(^{6}\) Source: Council of Supply Chain management.

\(^{7}\) Source: Ministry of Commerce, China Logistics Alliance Network and China Logistics Information Centre.
193. While it is difficult to generalize on trends in such a diverse sub-region with significantly different stages of economic and infrastructure development, this section seeks to identify some of the key issues affecting both the expansion of advanced logistics in a domestic context and trade logistics in the international arena. There are a number of possible reasons for this slow evolutionary development, both from the demand and supply sides. On the critical demand side, the primary constraints have been the absence of some of the key demand drivers which promoted its evolution in many of the developed countries:

- a strong retailing or manufacturing sector, with major players capable of dictating delivery terms to their suppliers;
- the presence of large multinationals; and
- a willingness to outsource.

194. The retail sector in most GMS countries has been dominated by a system of wholesalers/traders, small local retail outlets and markets, rather than large ‘mega-market’ retailers. This approach tends to result in relatively small stock inventory levels being held at the wholesaler/trader level, due to their limited availability of funding to purchase in bulk quantities. The majority of wholesalers tend to have very limited storage capacity and often act as ‘middlemen’ without an inventory stocking requirement. The small retailers generally tend to hold much higher levels of stock at the point of retail due to the relatively low stock turnover, as compared to the supermarket-type retailing system with rapid turnover. This is evident by the amounts of stock often seen on the floor areas of ‘mini-markets’ and around market stalls. These small local entities also tend to buy in bulk from the wholesaler/trader to lower the purchase price and then ‘sit on’ the stock until it is sold. Market trading remains an important feature of the GMS environment and social network. This type of trading environment is generally not suitable for the application of advanced distribution or logistics systems because complex inventory control is not applicable and the emphasis is on minimization of distribution/transport costs rather than inventory.

195. There is an absence central and regional distribution warehouses systems, mainly due to the current wholesale/retailer trading system, with relatively small stock levels at the wholesale level as the stock is predominantly being held at the retail level. As retail space still remains relatively cheap, there appears limited pressure to ‘push’ the stocking requirement back on the wholesaler. This situation has major financial advantages to the wholesaler, who would normally be the party requiring the regional warehouse systems. In addition, there seems much more flexibility in lead times as customers are prepared to wait until the product arrives, as opposed to customer demand in developed countries where they require it instantly. It is not uncommon to find retail points out of stock on some product lines, especially in mini-markets.

196. The ‘volume’ mega-market or hypermarket sector where savings in inventory are much more critical has yet to become widely established in many of countries, though it has grown substantially in the last few years fuelled by the consumer boom in countries such as Thailand. It is no coincidence that the Asian countries with the most advanced logistics tend to be those where major retailers have a stronger presence, such as in Hong Kong, Japan, Korea and Singapore. However, in some GMS countries many of the pressures leading to superstore development are not strong, with their current retail sector being more based on small outlets which are an important source of local employment and income distribution. In addition, many of the customer demands of large retail organizations, such as instant access to multiple product choice, are considered to be less important. Many consumers readily accept delivery lead time delays in the retail system and do not insist on all products being available at a single
retail point. Another key factor in their slow penetration of the retail market is that prices for products at many of the mega-markets, where they exist, are generally higher than in the small retail mini-market shops. Most consumers only purchase small amounts at a time for financial reasons and demand for ‘outside of town’ facilities with parking are therefore less important.

197. Despite this traditional retailing profile, the development of the volume retail sector has been growing as the country’s wealth has expanded and become more disseminated. The growth of a larger, more demanding ‘middle class’ inevitably is leading to changes in customer preferences and demand. The ‘mega’ and ‘super’ store phenomena is expanding and so in parallel is the application of advanced logistics. A good example of this trend is Thailand where hypermarkets, megamalls and branded convenience stores have grown rapidly and a vibrant 3PL sector is growing to service their needs.

198. The manufacturing sector is also a major generator of logistics management services, especially in the automotive and electrical goods sectors. Experience in Asia generally suggests that it does not act as strongly as the retail sector as a logistics service promoter in the domestic market. Some Asian countries have a strong manufacturing sector using advanced trade logistics in their export trade but in which the domestic logistics sector remains weak, such as in Viet Nam and even PRC. The trade logistics sector tends to be stronger because the countries are often more oriented to development of an export economy than stimulation of domestic demand and because the requirement for advanced trade logistics is often driven by the external market – the foreign customer or his assigned 3PL.

199. Multinationals tend to be major promoters and users of logistics services. This may be at its simplest distribution of their products held in stock within a country, domestic logistics, or the more complex trade logistics. Two other factors can impact on their trade logistics which dictates the profile of their logistical operations. Firstly economic stability, if there are significant fluctuations in currency values the multinational is more likely to hold stock outside the country and only import on a JIT basis to minimize inventory risks. Secondly, high customs duties also promote external stocking strategies. Thirdly the market itself may be too small to justify stock holding facilities. Lao PDR is a good example of this situation whereby most multinationals service the country from stocks held in Thailand.

200. One of the greatest barriers to logistics development in Asia is the relatively low level of outsourcing. Logistics research\textsuperscript{53} has indicated that many companies in the developing countries of Asia are less likely to outsource than their European or American counterparts and ‘logistics’ companies confirm this is one of their major problems in breaking into new markets. While it is recognized this may be partly due to a lack of reliable experienced 3PL organizations to whom to outsource, it is as much more due to the traditional approach whereby all services were handled ‘in-house’ and many manufacturers have their own transport resources. In some ways, this is a cultural rather than a financial constraint and thus may take more time to overcome. In many GMS countries the overall logistics awareness levels among potential user organizations are still quite low.

201. In international trade logistics another major barrier is the use of traditional trading terms. The most common of the different international trading terms (INCOTERMS) used when buying or selling international products are as follows:

\textsuperscript{53} BIMSTEC Transport Infrastructure and Logistics Study (BTILS) 2008
• FOB – Free on board – the receiver pays all costs from when it is loaded at the overseas port;
• CIF – Carriage Insurance and Freight – the shipper pays all costs until the goods are discharged at the foreign port;
• Free delivered – the shipper pays all costs until the nominated ‘free’ delivery point; and
• Free ex – the receiver pays all costs from the nominated ‘ex’ delivery point.

These are shown diagrammatically in Figure 4.2.

Figure 4.2: Trading Terms

Source: Consultant

202. It can be seen that the international supply chain is from the factory to the receivers store and therefore advanced trade logistics is only optimized when using free delivered or ex-works trading terms where there is one party responsible for the complete chain. The more traditional terms of exporting on a FOB basis and importing CIF meant that importers and exporters were not responsible for costs in the overseas countries. However, their continued use particularly in Asia effectively splits the supply chain in two, thus compromising the advantages of applying advanced logistical systems and the use of multimodal transport Bills of Lading for door-to-door shipping. The issuing of multimodal through Bills of Lading with inland destinations or origins in Asia is still limited due to the perceived fiscal risks.

203. On the supply side, the development of the national 3PL sector has been constrained by a combination of factors:
• lack of demand, thus making it difficult to establish any real market penetration;
• lack of awareness on logistics, as opposed to transport; and
• dominance of small transport entities.

204. While clearly the lack of identified demand has limited the interest of national transport entities becoming involved in the sector, it is equally clear many national companies do not yet have the capacity to enter the logistics market. Suppliers in developed countries mainly evolved from road transport companies in the domestic market and forwarders in the international market. However, these were already large organizations prior to their evolution into becoming 3PLs and therefore they had the necessary resources and expertise to be able to make the transition required to meet the new service demands. The major problem in many GMS
countries is the market continues to be dominated by many small transport and forwarding companies.

205. A similar situation exists in relation to trade logistics whereby in many of these developing countries the national freight forwarding sector is similarly fragmented with many small entities having less than 10 employees. They are predominantly engaged in the customs clearance processing activities on behalf of a relatively small number of clients. Most of these entities have no warehouses and only have limited transport resources. There are often only a few larger organizations with a greater capability who are engaged in forwarding, transport and warehousing. However, even then few of these organizations are engaged in physical distribution and logistics involving inventory control and added value services – i.e. their coverage of the supply chain tends to be limited mainly to transport and some intermediate transit warehousing.

206. In many GMS countries foreign companies tend to dominate the trade logistics sector for two main reasons. Firstly, they already have the resources and skills to transplant into the sector. Secondly, much of the demand for services comes from the export or processing sector whereby the supply chain is controlled from abroad. The main reasons for this are as follows:

- foreign manufacturers/multinationals establishing operations in a developing country are familiar with the concept of outsourcing to 3PLs for their international logistics requirements. Many already have ‘master contracts’ which mean that the 3PL is contracted to provide services wherever that client establishes manufacturing operations;
- foreign buyers have their own advanced logistics systems managed either by themselves or their appointed 3PL and they ‘call off’ stock from the suppliers in a developing country to fit their needs and often use ex-works or depot trading terms; and
- foreign manufacturers engaged in processing use advanced logistics calling in raw materials only on a JIT basis to their production line, thus minimizing imported raw material stocks in country. They use the overseas 3PLs to organize inward supplies.

207. In all three of these common situations, the foreign manufacturer or buyer needs the services of the international 3PL (or forwarder) who is able to provide advanced trade logistical systems even in a market where there may be either no or only a basic domestic logistics activity. For example the garments sector in GMS has many 3PL companies actively working for European and US buyers who are controlling the export logistics in environments where there may be limited domestic logistics services. In Cambodia, PRC and Viet Nam 3PLs are active in the export sector on behalf of foreign joint ventures or processing traffic being ‘called off’ by overseas customers. A key feature noted is that presently the use of advanced trade logistics is mainly concentrated on movements from developing or export-orientated economies to developed economies, predominantly to Europe and the US. At this stage these concepts are not widely used for intra-subregional trade. This again suggests that the external market is the driver of trade logistics rather than internal factors.

208. Despite the relatively current low penetration of logistics services in many GMS countries, it is clear that changes are gradually taking place which will result in increased usage of logistical services. The rate at which these developments take place domestically will be mainly dictated by higher awareness levels of prospective users, the development of retailing and manufacturing sectors especially involving multinationals and a preparedness to outsource their supply chain management. Trade logistics is potentially the fastest growing subsector in
that it is an international activity subject to external demand pressures and is an activity in which foreign 3PLs can operate and develop almost in isolation of the domestic market.

209. With the linkage between logistics and retail demand, logistics tends to be practiced more in countries with a high consumer demand. The ADB’s Asia 2050 Study\textsuperscript{54} suggests that the drivers of transformation include continued globalization, doubling of urban population and that Asia will account for the majority of the world’s middle class. This combination of concentrated demand and wealth spread represent prime conditions for creating the type of demand for advanced logistics and 3PL activities both domestically and internationally.

210. These changes will need support from the public sector in terms of enhancing the enabling environment. This will mean pressure for improvements in transport infrastructure in particular, which are supported by changes in trade and transport facilitation practices. Moreover, there is a risk that improvements in logistical practices could potentially become increasingly constrained by limitations within the transport networks particularly as retailers and manufacturers spread inland from existing conurbations seeking new markets or lower labor costs.

C. Country Assessments

1. Cambodia

211. The Cambodian logistics market is relatively immature domestically, but has developed more in relation to its international logistics activity. The pressures indicated above of megastore retailing and complex product manufacturing for the domestic market have not evolved at this stage on the scale necessary to stimulate domestic demand. The country remains reliant on traditional wholesale and individual shop/market retailing systems, the dominant production is lower value in agricultural goods and there is little outsourcing with most traders being small and using their own resources. In parallel there are almost no significant sized domestic transport entities capable of evolving into a 3PL, even if the demand were there. Clearly an active domestic sector is unlikely to develop until 2015 onwards and only then if the demand stimulants are present and there is a significant development of local logistical expertise.

212. However, the situation in the trade logistics sector is much more developed given the increased export-orientation of its economy. Foreign Direct Investment (FDI) in the manufacturing sector using the low wage benefits has created a demand for international logistic services. This is most evident in the garment sector which is mainly concentrated around Phnom Penh. As in South Asia, the overseas purchasers of such goods are ‘calling-off’ stock at the end of the production line, providing added-value services (cleaning, cutting, pressing, packaging, labeling etc.) in-country and then shipping them to end-users retail outlets without the need for further processing in the more expensive overseas. This type of supply chain management requires foreign 3PLs to act on behalf of the overseas customers. There a few, if any, national forwarding entities with the resources or skills to be able to act for foreign clients who are dictating the supply chain. Much of this traffic is being containerized and being sent along the Southern Corridor to New Saigon Port rather than sent to Sihanoukville.

213. Given this significant difference between the international and domestic sectors it would be hoped that the 3PL capability would gradually disseminate to enable national companies to

\textsuperscript{54} Asia 2050 Centennial International Group January 2011
compete. However, it may be difficult for such new entities to penetrate the premium sectors of international logistics as they lack the credibility and resources. Thus, the way forward is much more likely to be through the development of joint ventures with overseas based 3PLs. The main requirements of the international 3PLs operating in Cambodia is likely to be improvements in the road link between Phnom Penh and Cai Mep port in Vietnam and the Bavet/Moc Bai border crossing. Improved road linkages to Sihanoukville appear to be lower priority due to the poorer quality and regularity of shipping services from that port.

2. Lao PDR

214. The logistics industry in Loa PDR is considered to possibly be even less developed than in Cambodia. There is no significant domestic market because of the retailing system and the types of products being distributed nationally. The primary demand for logistics in minimization of inventory is virtually non-existent in the domestic market. Unlike Cambodia it does not have such an active international sector because the foreign 3PLs presence is relatively minimal. This is because most export goods are generally not subject to controlled supply chains. Most imports and much of the exports consist of bilateral trade handled by smaller traders and their local forwarders, both of whom have limited resources. The national transport and the forwarding sectors lack the human resource capability and technology adoption to become 3PLs in the near future.

215. Among the major constraints on the industry are (i) lack of modern, transparent, market-based business operations with outsourcing; (ii) a regulatory system aimed at controlling and extracting rent, rather than facilitating business operations; (iii) restrictions imposed by cumbersome licensing regulations; and (iv) decentralization of trade regulations that overlap with central government trade controls and increase the complexity of doing business in Lao PDR. As a result most freight forwarding companies remain small and are seldom seen as principals in the international freight business.

216. Growth in the logistics sector is more likely to be in the international sector, provided there is increased demand to produce higher value manufactured goods based on cheap labor rates, such as has taken place in Cambodia. The foreign 3PLs are present, though in limited numbers, but are principally offering standard transport and forwarding services rather than added-value logistics. The complication of the need for stuffing and unstuffing at the Thai ports because of the traffic imbalance tends to make the application of advanced logistics more difficult. The use of modern logistics is most advanced in the garment industry, but the potential for growth in this sector seems questionable due to its reliance on special market access arrangements particularly by the EU. Problems in attracting FDI in quality manufacturing in general represent a significant constraint to developing 3PL services.

217. As the international market develops, the principle infrastructure demands by 3PLs are likely to be road improvements between Vientiane and Laem Chabang (Central Corridor) and in facilities at the Nong Khai border. Indications are that increased activity around Pakse could lead to pressures to improve the Pakse – Laem Chabang route and border facilities at Chong Mek–Wang Tao. The road on the Thai side from the border to Nakhon Ratchasima is not a GMS corridor, but is being developed with World Bank assistance. Theoretically, there is strong demand for an ICD at Nong Khai or preferably within Loa PDR, but the scale of the traffic imbalances suggest the shipping lines would be reticent to issue through bills of lading to encourage through movements. Improved transit arrangements, preferable with stuffing and unstuffing of containers within Loa PDR would assist in helping to integrate the supply chain, whereas at the moment much of the exports are sold loose FOB Bangkok or Laem Chabang
rather than ex Lao PDR. The reality is that Nong Kai is acting as an inward distribution center for Vientiane and the Thai ports as export consolidation centers. The overall logistics strategy is to change Lao PDR from being a landlocked country, to being a land-linked country.

3. Myanmar

218. The situation is understood to be similar in Myanmar, though information on the status of the market is difficult to access. In general the country lacks the demand criteria to suggest there is a domestic logistics market of any size. While there are indications of major retailing outlets, such as supermarkets, their market penetration is very low nationally, less than 10% and there is limited higher value manufacturing activity at this stage. The need therefore for complex inventory control mechanisms is not evident because it is a supply-driven market where shoppers are eager to buy almost anything that is available. In addition, the national transport sector is characterized with large numbers of small operators and the low cost of entry with lots of small vehicles tends to lower the need for inventory and quick replenishment strategies. The difficult economic climate with sanctions limiting availability combined with only a small middle class suggests that domestic 3PL-type logistics demand is probably low.

219. Whereas in many of the other GMS countries the development of logistics has been led by the international sector, this is understood to be less so in the case of Myanmar. The main reason for this has been the lack of FDI and the purchasing strategies of the multinationals and buyers in the developed countries. As a result international trade is mainly based on standard segregated transport, warehousing and clearance strategies with importers buying CIF and overseas buyers buying FOB. Another reason for the lack of demand for 3PLs is the overall lack of transparency and consistency in charges that increase the risks associated with being responsible for operations within the country, given that most 3PLs present in the country are foreign owned. While these operators are marketing logistics services in practice they are usually performing standard forwarding activities.

220. As Myanmar ‘opens up’ to the external market it is evident that with their lower labor costs the logistics sector will tend to replicate those of Cambodia. This would be expected to be led by the garment sector and possibly furniture with the existing 3PLs on hand to offer logistical services. Local penetration of this market may be difficult other than through joint ventures. Given the lack of existing advanced logistics some national investment in technology and human resources will be essential to make it competitive.

4. PRC

221. Expenditure on logistical services in PRC is estimated at around 18% of GDP\(^5\), twice that of most developed countries. The market tends to be fragmented in terms of numbers of players and their geographical remit and these inefficiencies are exacerbated by other factors such as transport bottlenecks, regulatory constraints and local barriers to entry, all of which lead to increasing costs. While the growth in the sector has been fuelled by the rising demand for products and services, unlike developed countries the market driver has tended to be the industrial rather than the retail sector. This is partly due to the slow maturing of the retail sector and the high focus on export manufacturing, especially of higher value products.

222. The concept of logistics in PRC is still relatively new, especially outside the export manufacturing sector. Traditionally logistics has been seen as transport and the majority of

\(^{55}\) KPMG Logistics in China (2008)
state owned enterprises (SOE) continue to handle this in-house. This has led to a three-tier structure of national, provincial and local levels with most state owned transport companies only operating in their immediate environs with limited incentives to establish national networks. SOEs in particular tend not to outsource and use traditional transport, warehousing and handling methods as separate activities and to have limited coordination logistics requirements on an inter-provincial level. Indeed, a key constraint to development has been the reticence to outsource with only around 15% of companies outsourcing in the domestic market, compared to 35% in the EU and 57% in the US.

223. Market development has been spearheaded by foreign operators following market liberalization and PRC membership of the World Trade Organization (WTO). Domestic players are now responding by upgrading facilities and services to compete. The combination of growth in megastore and supermarket retailing, as domestic demand is stimulated by a growing middle class with spending power and increased manufacturing of products for the home market should together increase the pressure for enhanced inventory control and thus create more demand in the domestic 3PL sector. The export sector, particularly those foreign invested manufacturers, is looking for further improvement in their supply chains and is driving the market demand for 3PL services. Foreign or foreign invested companies have typically already cornered much of the express delivery, sea freight forwarding and specialized logistics markets.

224. The situation in Yunnan Province and in Guangxi Autonomous Region are not well documented, but given the profile of both areas and the limited high value export manufacturing activity it would be expected that logistics is significantly less advanced than on the southern and eastern seaboards. The logistics industry in these two GMS areas remains unstructured and dominated by small enterprises that have little specialist knowledge of logistics or resources to undertake supply chain management. For Yunnan in particular the major logistic constraints cited have been the lack of leadership and coordination from the provincial government and lower level government agencies; the unstructured nature of the logistics market with unclear regulations over market entry and operation; and the fragmentation of logistics resources with the need to restructure and privatize state-owned enterprise (SOEs).

5. Thailand

225. Of the GMS countries, Thailand is probably the most advanced, though still well behind most developed countries. This is because the demand for 3PL services in the domestic sector has only been realized in recent years. The entry of some of the major international retailing organizations has tended to stimulate the market, especially in the major conurbations and driven the need for supply chain management and inventory control. While in some cases these organizations have brought the 3PL skills with them or employed foreign expertise approximately 70% percent of logistics businesses are owned by Thai nationals, but with over one-half of the industry’s capital belonging to foreign-owned businesses.

226. The developments within the retailing sector have not been reflected as strongly in the domestic industrial sector. Generally these entities are not aware of importance of logistics and supply chain management and their level of outsourcing is low. The domestic logistics industry has also been protected by government to prevent foreign business from entering the market. Many local providers offering logistics services are really transport providers with 90% being SMEs, thus are not really 3PLs in the conventional sense.

227. Given Thailand’s export-orientation and the high level of FDI in manufacturing of higher value goods where supply chain and inventory management are critical, it is not surprising that
3PL penetration of the international sector is much more widespread. However, as in the other GMS countries foreign owned enterprises are dominant, either because they have the necessary skills and resources or due to the routing control of export goods being overseas. Many multinationals have logistics ‘master contracts’ where a single supplier is responsible globally for their 3PL services. Most Thai providers still lack the information and communication technology, HR skills and overseas networks to be able to provide the complete service package of the large, foreign-owned companies operating in the country.

228. From a logistics perspective Thailand has the potential to be a ‘hub’ for the GMS region given its strategic location, good road transport network and significant presence of major 3PLs. Already there is evidence to suggest that Loa PDR is increasingly reliant on logistics services from Thailand and this is expected to extend to Myanmar as opportunities arise. As the domestic market in particular matures, it is expected that national expertise will become more evident and enable Thai operators to be more competitive in offering 3PL services for intra-regional trade.

6. Vietnam

229. The logistics and distribution sector in Vietnam has yet to achieve any really significant market penetration, other than in connection with foreign investment in export manufacturing. There are been a number of reasons for this slow development, both from the demand and supply sides. On the demand side the primary constraints have been the absence of the key demand drivers that have promoted its development in other countries: a strong retailing or manufacturing sector with major players capable of dictating delivery terms to their suppliers; the presence of large multinationals holding inventory stock close to their end-users for JIT delivery and overall high inventory storage costs.

230. The domestic sector in particular has been slow to develop because of the dominance of the system of wholesalers/traders and small retail outlets resulting in relatively small stock inventory levels at the wholesaler/trader level with the small retailer generally tending to hold much higher levels of stock at the point of retail. This type of micro trading environment is not suitable for advanced distribution or logistics services. The ‘volume’ supermarket sector where savings in inventory are more critical has yet to become widely established in Viet Nam, though there are signs it is gradually growing as the country’s wealth continues to expand and become more disseminated and customer preferences change.

231. The area where advanced logistics is having the most impact is in the foreign-owned manufacturing sector, as well as the export sector in general. In the case of the former, this is because such organizations are familiar with the concept and its benefits and, most importantly, their operations in Viet Nam often form part of overall global supply-chain. In relation to exports in general, the pressure to use advanced logistics is often being applied by the overseas buyer in that exports from Viet Nam have to be compatible with the buyer’s supply-chain requirements. In many cases the overseas customer is ‘calling off’ stock from the producer in Vietnam on a JIT basis, making appropriate allowances in transport lead times.

232. At present, foreign entities or joint ventures tend to dominate the logistics sector for two main reasons. Firstly, they already have the resources and skill to transplant into the sector. Secondly, the major demand has come from the export or reprocessing sector, where routing control lies overseas. Viet Nam’s international trade in products suitable for advanced logistics is predominantly based on trading terms whereby the overseas party is responsible for the international movement and therefore that party selects his 3PL to manage his supply-chain.
This can make it difficult for national companies to achieve any real market penetration, even if they had the skills and resources. However, despite their inefficient operations small national providers often undercut the logistic enterprises that are offering a wider range of services. Pricing tends to be unreliable and untrustworthy since operators often charge different prices from those initially quoted. There are presently about 800 freight forwarders and transport businesses in Viet Nam and these can only satisfy about one-fourth of the total logistic market demand. In practice, the services provided by the majority of local freight forwarders are generally utilized by SOEs, while the foreign manufacturers ship with JV companies or local providers who become agents for larger foreign logistics companies.

D. Development Needs

233. The logistics industry is not well understood institutionally in the GMS area or even by the general public. It is seen as a transport or warehousing or forwarding service (2PL services), rather than an integrated added-value service provider (3PL) for retail and industrial clients. It is recognized the industry itself is also partly to blame in that practitioners are indicating they are offering 3PL, or even 4PL services, when in reality they are normal 2PL operators offering standard transport-related services. The result is that in most GMS countries the industry lacks recognition and consequently the necessary institutional support to help it develop. There is a need for the establishment of strong national logistics representation with good contacts with the Government departments responsible for their services, either in their entirety or more likely transport, warehousing or forwarding activities.

234. The role of logistics in optimization of the supply chain will continue to grow driven by the effects of globalization. The domestic sector will most likely be driven by developments in the retailing sector encouraged by the increased spending power of their customers and by the higher value manufacturing sector in meeting its national distribution requirements. The more advanced economies of PRC and Thailand would be expected to experience the fastest growth, whereas in Cambodia, Lao PDR and Myanmar the transition from traditional methodologies is expected to be significantly slower. While increasing costs will raise the focus on improving inventory control and supply chain management, the primary need to stimulate the domestic market will be an increased willingness by industrial clients to outsource. This will require more effective marketing by operators and the presence of larger entities with the necessary resources to invest in new technologies and staff. In general the capacity building in logistics is often reliant on in-house training programs provided by foreign 3PLs, rather than from within the public domain. A more accessible capacity building system is required to ‘professionalize’ the industry and increase the numbers of persons with basic skills to enter it.

235. The international sector is already well established in most of the GMS countries. This is being driven by the export-orientation of manufacturing and pressure from overseas customers to manage and secure their supply chains. This trend is likely to continue and the market be dominated by foreign companies or joint ventures. It is recognized it may be difficult for national companies to break into the international sector, but this should not be a reason for restricting the activities of the international players. Indeed, these companies are critical to dissemination of skills into the national marketplace. Joint ventures in particular should be encouraged to help the sector establish itself nationally.

236. Further developments in logistics services require improvements in the responsiveness of the private sector to the demand of the shippers. The policy environment should encourage competition in the provision of logistics services and permit vertical integration to allow a second tier of integrated logistics providers who can offer value-added services. Public sector support
will be needed to help develop privately-operated terminals to improve logistics services, including intermodal terminals etc. and improvements in border processing.

237. Logistics, like transport, tends to operate most effectively in a lightly regulated environment. The logistics industry is client-driven focusing on providing services, rather than in developing fixed assets. As such it can remain flexible and innovative. The quality of services should predominantly be based on competitive forces where industry leaders drive innovation and are not constrained by regulatory pressures. In most cases existing regulation probably addresses the major components of logistics and thus the need for specific regulation of the industry is unnecessary. The need is potentially for removing any regulatory constraints instead of introducing more regulations.

238. There is a need to gradually extend the range of products which are subject to successful supply chain management. While products such as auto-parts, electrical goods and certain consumer goods such as garments are already utilizing logistics services, especially in the export sectors, many of the staple trading goods in the GMS region, such as in agricultural goods, have yet to use such modern logistical techniques. Diversification of customers and types of products by 3PLs through effective marketing will be needed to attract new sources of business.

239. The industry nationally in many countries remains highly fragmented in terms of size of individual firms and the range of services offered. Consolidation within the road transport and forwarding sectors in many of the countries is urgently needed in order that the resulting larger entities can make the quantum leap towards being genuine third party logistics providers.

240. If the countries of the GMS wish to develop their trade facilitation environment then they will need to embrace the concepts involved in international trade logistics. The developed markets on which they are reliant will increasingly demand security and reliability of their supply chains between producer and consumer and this will mean increased involvement in what happens within the GMS countries with whom they are trading.

E. Conclusions

241. This initial assessment of the transport services in the GMS highlights the following:

- Logistics is seen as a separate industry by the third party logistics operators active in the industry. This differs from the institutional perception which tends to regard logistics as transport. Logistics is about management of the supply chain and inventory control rather than solely the simple physical movement of product;
- Trade logistics is the management of the supply chain in an international context and includes the moving of product over international borders;
- Logistics is a service industry and is therefore demand driven. Globally the demand drivers have been the major retailers and multinational companies. These organizations increasing outsource the management of their supply chains to third party logistics providers who in turn are seeking to provide integrated services, thus extending their control along the logistics chain;
- The domestic logistics industry in the GMS region is relatively immature due to the lack of demand drivers in the domestic sector, such as major retailers and manufacturers capable of dictating their supply chains, the limited presence of multinationals and a willingness to outsource;
The international sector is much more developed being driven by the needs of overseas customers to control their supply chains. Many of the GMS countries are export manufacturing-oriented and given the use of certain trading terms the routing control is predominantly with the overseas importers. They appoint a logistics operator to handle their traffic resulting in the international sector being dominated by foreign operators or joint ventures;

Fragmentation of the transport and forwarding sectors in most GMS countries with many small operators with limited resources means they lack the ability to develop into either domestic or international 3PL operations;

The application of logistics activities in the domestic market is considered to be low in Cambodia, Lao PDR and Myanmar, a little higher in Vietnam and highest in PRC and Thailand, but still low compared to developed countries. This is principally due to the lack of demand drivers and potential national service providers;

The application of logistics services in the international sector is much more widespread in GMS countries, especially in relation to the garment and higher value manufacturing sectors. This is due to pressure from overseas customers and the presence of foreign or joint venture 3PLs;

The logistics industry in most countries, especially domestically, lacks recognition and a strong organization structure capable of representing the industry in its links with government ministries;

There is a need to encourage foreign operators, especially joint ventures, to help build up a national capability. Consolidation within the transport and forwarding sectors is essential to establish entities of sufficient size to undertake 3PL services;

The sector does not require further regulation as it operates best in a lightly regulated environment and most of the activities involved in logistics are already subject to some regulation. There is a need to stimulate competition based on flexibility and innovation rather than developing separate regulation;

The logistics sector will need to gradually diversify to handle more types of product as it is currently concentrated on a relatively limited range of commodities; and

Development of trade logistics within the region using 3PLs is not an option, but will be mandatory to maintain growth in trade with developing countries.
V. PROFILE OF GMS TRADE

A. Introduction

242. The objective of this initial GMS trade analysis is to provide some indicative evidence of trade traffic demand, both relating to intra-GMS transport movements and those to and from external markets also being conveyed along the various land transport corridors. This outline assessment is designed to help undertake trade demand mapping and from that identify the likely priority trade transport routes in the subregion.

243. Comprehensive data on international trade traffic flows moving along the various GMS corridors and other routes is not generally available. Most GMS studies have been reliant on the use of macro-economic trade data based on value when projecting freight traffic flows and future growth, whereas in practice the freight transport demand is volume or tonnage-related. In very few cases has route specific data been collated and analyzed to calculate the trade traffic volumes likely to move along particular corridor links.

244. There is no direct correlation between the value of goods being traded and the tonnage to be physically moved. For example, some GMS countries have a vibrant manufacturing activity producing high unit cost products, such as garments and electrical goods, whereas others depend more on the trading in low value goods, for example raw materials and agricultural goods. In general, this latter traffic often tends to represent the major traffic flows. This ‘mismatch’ between the use of trade data based on value and the freight transport demand on tonnage/volume could partly explain why the projected trade traffic flows moving along some GMS corridors does not always correlate with the later actual flows in terms of physical movements of trucks or wagons along these international routes.

245. An additional problem is that by using value-based projections, it takes no account of the traffic imbalances, the difference in volumetric terms between exports and imports. This occurrence affects the overall quantity of freight transport movements as traffic levels on the corridor tends to be dictated by the larger directional flow, with probable empty running on the return journey. Many of the GMS countries have significant imbalances in their intra-subregional trade tonnages, often greater than the value differences might at first suggest.

246. This initial trade assessment has mainly used modeling data based on the COMTRADE 2009 returns, together with some value data from the 2010 returns. Most countries submit their import-export data on an annual basis by value, but also indicate weights and units for many commodities being traded based on the UN Harmonized Commodity Classification system. Unfortunately, not all commodities are recorded on a weight basis and some GMS countries do not provide these detailed trade breakdowns annually. In addition, the data represents the information provided by each country, but it is not validated in terms of cross-referencing between trading partners. In some cases these differences can be substantial, particularly, for example, in the case of PRC and its neighbors.

247. In order to compensate for the above caveats, those commodities not recorded on a weight basis have been converted into tons using sample data from other countries. In addition, the weights of certain commodities which are not transported along road, rail or maritime

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56 Model data developed under TA 7557 Promoting Regional Infrastructure Development (2011)
57 COMTRADE is the United Nations Commodity Trade Statistics Database which contains annual trade data from all participating countries. Data is shown based on the UN Harmonized Commodity Classification System
corridors have been excluded, such as electricity, gas, water, ships, aircraft etc. though their value has been retained. Where countries did not report annually, their trade data was compiled on the basis of returns submitted by their trading partners.

B. GMS Trade

The direction of trade over the past two decades suggests a marked expansion in GMS' countries trade not only with the world, but especially among themselves (Figure 5.1).

**Figure 5.1: Direction of Trade: 1990-2010**

GMS = Greater Mekong Subregion; ASEAN-5 = Brunei Darussalam, Indonesia, Malaysia, Philippines, and Singapore; PRC = People’s Republic of China; EU = European Union; US = United States.

Cambodia’s direction of trade is the exception to this trend probably due to the ban on log exports which reduced its subregional trade in favor of the US and EU as export destinations. The increase in Cambodia’s intra-GMS trade in the latter part of the 2000s has mainly occurred as a result of falling demand for Cambodian exports in the US and the EU due to their financial crises. The larger GMS countries, Thailand and Viet Nam, have shown modest increases in subregional trade and trade predominantly with the rest of the world and therefore have more diversified partners. Japan continues to be Thailand’s biggest trading partner, although Japan’s share has been steadily declining in recent years and is likely to soon be overtaken by the PRC. The PRC is already Viet Nam’s leading trading partner, accounting for roughly 20% of its trade in 2010. However, intra-GMS trade only represents a minor proportion of the region’s trade – 11% as shown in Figure 5.2.

**Figure 5.2: Intraregional and Interregional Trade in Asia**

Source: ADB TA 7557: Promoting Regional Infrastructure Development project

The share of intra-GMS trade in total trade has traditionally been higher for the subregion’s smaller trading countries (such as Lao PDR and Myanmar) reflecting both transshipment arrangements and limited commercial penetration beyond their immediate neighbors. Between 2005 and 2009, trade within the subregion accounted for over two-thirds of total trade in the Lao PDR and more than one-third of total trade in Myanmar, with both countries trading most intensely with Thailand. During the same period, Thailand accounted for 83% of the Lao PDR’s total intra-GMS trade; this was even higher in the case of Myanmar at 98%.

Changing demand for export products has helped transform the structure of exports. In Cambodia and Thailand, there has been an appreciable move away from primary commodities...
towards labor-intensive manufactured goods. In Viet Nam, primary commodities still make up nearly 30% of total exports, but again there has been a clear shift towards a more diversified export base. In the Lao PDR and Myanmar, there was a similar transfer away from primary commodities in 2000, but this has since reversed due to increased external demand for primary commodities, particularly ores and metals in the case of Lao PDR and natural gas in the case of Myanmar.

252. This shift towards manufactured export products has been most pronounced in Cambodia, where textiles and garments quotas from the US and EU led to the emergence of an extremely narrow export base dominated by clothing and footwear. In 2010, clothing and footwear accounted for 88% of Cambodia’s total exports by value, with the bulk of clothing and footwear exports (80%) going to the US and EU markets. In Thailand, trade in machinery and other equipment comprised almost half of total exports in 2010 with production fragmentation trade becoming a critical part of Thailand’s export dynamism. There are indications that Viet Nam is following suit, as the share of machinery and equipment in Viet Nam’s total exports has risen to 18% in 2010. At present, however, clothing and footwear and other manufacturing continue to make up the bulk of Viet Nam’s manufactured exports, accounting for 26% and 27% of total exports in 2010.

253. It is recognized that trading activities within the GMS area has two dimensions: formal and informal. Formal border trade refers to trade transactions conducted through appropriate customs procedures at the border in accordance with rules, regulations and agreements of the governments involved. Informal cross-border trade involves transactions which are subject to unofficial arrangements, bypass or evade appropriate customs procedures. Informal border trade in the form of localized ‘cross-border’ trade can be significant in parts of the subregion whereas at other frontiers smuggling-type activities have become endemic. Such informal trade estimates range from approximately 30%–50% or more of total recorded trade. In this initial assessment, only formal trade, as recorded by Customs has been included, but note is taken where it is believed informal trade volumes could be more significant.

254. The following sub-sections provide a more detailed analysis of trade in the six GMS countries in terms of both value and estimated tonnage based on the modeled COMTRADE 2009 data shown in Table 5.1. It can be seen that the value and weight ratios often differ significantly and this has important implications in terms of identifying the nature of traffic ‘demand’. In addition lower value commodities generally represent the main traffic to be conveyed tonnage-wise, whereas important higher value commodities often do not feature, either because they are traded less intra-subregionally or the tonnages to be moved are not high in comparison. Thus, when simulating ‘trade demand’ there will need to be a balance between the higher value export trade which is an important national revenue generator and the lower value higher volume commodities, such as agricultural goods and raw materials, that often represent key employment opportunities for the poor away from the cities. In addition, there is a need to place similar importance on imports as exports, not only because in intra-subregional trade one country’s exports is another’s imports, but also because they reflect the needs of a particular country and also may help balance trade volumetrically, which could result in lower transport costs.
a. Cambodia

255. Cambodia has the second smallest trading activity of the GMS counties. In both value and tonnage terms it is highly dependent on trade with its neighbors in relation to imports (over 90%), but significantly less in relation to exports (under 10%) mainly due to the flows of garments to the US and EU in value terms and shipments of sand to Singapore in volumetric terms. If the latter is excluded over 80% by tonnage goes to other GMS countries. While it is a

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Source: COMTRADE and TA 7557 data
net importer with estimated current imports of around $5.5 billion and imports of around $5.3 billion the ratio is only 1.06:1 in favor of imports. However, in tonnage terms the ratio is almost 3:1 in favor of exports. The major import commodities by weight are cement (35%), petroleum (16%) and sugar (9%) and the main export commodity is sand (94%).

256. Thailand is its largest and most important GMS trading partner accounting for approximately a third of imports by tonnage and almost 60% of exports, when excluding the sand traffic. The ratio of imports to exports by weight is estimated 6:1 in favor of imports, thus suggesting significant transport imbalances. The main import traffics by weight are cement (51%), sugar (13%) and fuel (5%) and the main export commodities are agricultural products accounting for over 85% of trade.

257. Viet Nam is also an important trading partner accounting for almost a third of imports by value, but only 5% of exports. The import:export ratio is 7:1 by value, but as high as 10:1 by weight, thus again suggesting major transport imbalances. The main import commodities by weight are petroleum products (49%), iron and steel (17%) and fertilizer (9%), some of which are probably re-exports reflecting Viet Nam’s position as a southern gateway to eastern Cambodia. The main exports by weight are wood (37%), rubber (19%) and vegetables (17%).

258. PRC is another import trading partner accounting for 28% of imports by value, but only 1% of exports. Cambodia is a net importer by value with an import:export ratio of 7:1 in favor of imports, but a 14:1 ratio by weight, again indicating a major imbalance. The main import commodities by weight are slag (11%) and salt (10%) and the main export items are rubber, timber and clothing.

259. Formal trade with Lao PDR is relatively minimal accounting for less that 1% by value. The main import is veneers and the main export is electrical equipment and cars, most of which are probably re-exports. No data is available on trade with Myanmar, but indications are that it is relatively small.

b. Lao PDR

260. Of the GMS countries Lao PDR has the smallest international trade and is the most dependent on trade with its immediate neighbors, as would be expected given its landlocked status. A net importer, its current imports are estimated at approximately $2.7 billion and its exports at $1.3 billion, thus a ratio of 2:1 in favor of imports. However, in tonnage and consequent transport demand the difference is much less with around 2 million tonnes of exports and 1.75 million tonnes of imports, a ratio of only 1.14:1. Of its imports over 90% comes from its neighbors with the major commodities by weight being cement (24%), fuel (13%) mineral water (5%) and building materials (5%). Of its exports almost all is for neighbors with the main commodities being coal (24%), stone/gravel (15%), maize (13%), copper ore (11%), pulses (10%) and processed copper (3%).

261. Thailand is its major trading partner accounting for almost 70% of imports and 40% of exports by value. The import market may be partially distorted by Thailand acting as the 'gateway' to Lao PDR with goods from third countries being imported into Thailand and later redistributed to Lao PDR, a common phenomenon with small landlocked countries. The ratio of imports to exports by weight is estimated at 1.6:1 in favor of imports, thus suggesting a significant freight traffic imbalance with 'inbound northbound' traffic appreciably exceeding 'outbound southbound' traffic. The main imports by weight are cement (26%), fuel (14%),
mineral water (5%) and building materials (5%). The main exports are coal (35%), stone (22%), maize (17%), refined copper (4%) and timber (4%).

262. PRC is its second largest trading partner accounting for almost 15% of imports and one third of exports by value. The ratio of imports to exports by weight is estimated at 5.4:1 in favor of exports, as opposed to almost 1:1 by value. Clearly, this again indicates a substantial trade traffic imbalance with the major flows being northbound into PRC with limited return traffic. The main import by weight is fertilizer (11%) and main exports by weight are copper ore (38%), pulses (32%), maize (8%) and lignite (5%).

263. Viet Nam is the third largest trading partner accounting for a quarter of all exports, but only 6% of imports by value. The ratio of exports to imports by weight is 1.4:1 in favor of exports, broadly similar to the 1.7:1 by value. This suggests a traffic imbalance, but probably not significant in terms of its impact on rates and traffic flows. The major imports by weight are cement (28%), fuel (21%), coal (17%) and steel (9%) and the major exports by weight are copper (44%), gypsum (23%) and timber (16%).

264. Lao PDR had not filed 2009 data with COMTRADE, neither had Cambodia or Myanmar, thus cross referencing was not possible. From data that is available the indication is that formal trade between Lao PDR and Cambodia is relatively minimal. This is not particularly surprising as they are both principally agrarian economies dealing in similar products and there is limited industrial activity providing demand for goods required in the other country or sourcing of raw materials. The situation is understood to be similar in relation to Myanmar with only low volumes of formal trade, but possibly a more appreciable level of informal localized cross-border trade.

c. Myanmar

265. Trade data for Myanmar is not available through COMTRADE, but some indication can be gained by transposing data from other countries that do submit reports. Unfortunately Cambodia and Lao PDR have not submitted recent trade data either and thus such transposition was not possible in relation to their trade. Based on data transposition Myanmar is a net importer with an import:export ratio of 1:1.06 based on value, but an export:import ratio of 1:1.89 based on weight. The main imports are dominated by cement (32%) and exports by sand (50%), vegetables (11%) and ores (10%). It should be noted that some important export shipments such as offshore gas and oil have not been included.

266. Thailand is its largest GMS trading partner accounting for 25% of imports and 47% of exports by value. The ratio of imports to exports by value is 1.8:1 in favor of exports, but by weight is 3.7:1, thus indicating a major transport imbalance which would be expected to impact on transport costs. The main export commodity by weight is oil which accounts for 94% of exports and the main import commodities by weight are cement (59%) and petroleum (8%).

267. PRC is the second most important partner accounting for 35% of imports by weight and 11% of exports. The ratio of imports:exports is 3.5:1 by value but this is reversed in tonnage terms to 1:1.8 in favor of exports. The main import commodities by weight are cement (16%) and fuel (5%) and main exports are manganese (27%), iron ore (20%) and beans (20%), but significant exports by value of electricity and timber.

268. As indicated no data was available on trade between Myanmar and Viet Nam, Cambodia or Lao PDR. Anecdotal indications are that volumes are relatively minimal, possibly with some
localized cross border trade with Lao PDR. It is believed that the informal trade between Myanmar and PRC and Thailand could be much significant given sanctions and other restrictions covering both imports and exports.

d. PRC

269. No detailed analysis was undertaken of overall trade for PRC because only Yunnan Province and Guangxi Zhuang Autonomous Region are included within the GMS initiative and data by province is not readily available or reliable. Neither area is considered to be a significant trade generator when compared to the eastern seaboard or the Guangzhou - Shenzhen - Hong Kong industrial conurbation. The relatively low volumes of trade crossing between these areas and Vietnam, Lao PDR and Myanmar relative to their total trade to these countries tend to confirm this perception.

270. PRC’s largest trading partner in GMS is Thailand, though this represents less than 2% of its overall trade by value. The trade is almost balanced in value terms with a ratio of 1.05:1 in favor of exports, but this reverses to 2.4:1 in favor of imports by weight. The main import products by weight are vegetables (29%), fuel (9%), rubber (7%), iron ore (7%) and chemicals (6%) and the main exports by weight are fertilizers (8%), carbonates and sulphates (5%) and fresh fruit (2%).

271. Viet Nam is also an important regional trading partner, though again it represents less than 2% of PRC exports and less than 1% of imports by value. PRC is a net exporter by value with the export to import ratio being 3.3:1 by value but the reverse by tonnage where the ratio is 2:1 in favor of imports. 80% of these imports are accounted for by coal shipments. The main export traffics by weight are iron and steel products (22%), fertilizer (15%) and fuel (6%).

272. Myanmar is the third largest regional partner, but accounts for less than 0.5% of PRC trade by value. While exports far exceed imports in terms of value by a ratio of 3.5:1 the situation is reversed in tonnage terms where imports exceed exports by 1.8:1. The main imports by weight are manganese (27%), iron ore (20%) and beans (20%) as well as timber and the main exports by weight are cement (16%) and fuel (5%).

273. Cambodia is the next most important, though accounting for less than 0.1% of overall trade by value. Exports exceed imports by a ratio of 7:1 by value and as high as 14:1 by weight. The main export commodities by weight are slag (11%) and salt (10%) and the main import items by weight are rubber, timber and clothing.

274. Despite being a neighbor, trade with Lao PDR is relatively minimal. The ratio of imports to exports by weight is estimated at 5.4:1 in favor of exports, as opposed to almost 1:1 by value. The main export by weight is fertilizer (11%) and main imports by weight are copper ore (38%), pulses (32%) maize (8%) and lignite (5%).

e. Thailand

275. Thailand is the largest individual trading partner in the GMS area. A net exporter its current exports are estimated in the region of $180 billion and its imports around $150 billion, though possibly less due to the adverse impact of the 2011 flooding. While the ratio of imports to exports is only 1:1.1 in value terms the ratio in tonnage terms is 1:1.85 indicating a significant imbalance in transport demand. Current tonnages are estimated at around 160 million tons of
imports and around 120 million tonnes of exports. The main import commodities by weight are oil (31%), coal (14%), gases (7%) and acids (7%). The main export commodities by weight are cement (15%), rice (9%), gypsum (6%) and sugar (5%), thus although Thailand has a major manufacturing activity this is not necessarily reflected in tonnage terms, but would be reflected in container movements that cater for such higher value products.

276. PRC is nominally Thailand’s largest trading partner in the GMS region, though the amount to and from the GMS part of PRC is unknown. It is expected to be relatively small (less than 10% by volume). Approximately 10% of Thai exports by value are destined for PRC and 13% of imports by value are from PRC. The main export products by weight are vegetables (29%), fuel (9%), rubber (7%), iron ore (7%) and chemicals (6%). The main imports are fertilizers (8%), carbonates and sulphates (5%) and fresh fruit (2%). The import:export ratio by value is almost 1:1, but in weight terms is 2.4:1 in favor of exports.

277. Viet Nam is the second largest GMS trading partner accounting for 3% of exports and 1% of imports by value. The ratio of exports to imports by value is 3.3:1 in favor of exports and by weight is estimated at 4.4:1. The main export commodities by weight are cement (40%), gypsum (16%), maize (5%) and fuel (4%) and the main imports from Viet Nam by weight are fuel (44%) and coal (38%).

278. Myanmar is the third largest GMS trading partner, but only accounts for 2% of imports and 1% of exports by value. The ratio of imports to exports by value is 1.8:1 in favor of imports, but by weight is 3.7:1, thus indicating a major transport imbalance. The main import commodity by weight is oil which accounts for 94% of imports and the main export commodities are cement (59%) and petroleum (8%).

279. Trade between Thailand and Lao PDR accounts for only 1% of Thai exports and 0.35% of imports, though is important to Lao PDR. The main exports by weight are cement (26%), fuel (14%), mineral water (5%) and building materials (5%). The main imports by weight are coal (35%), stone (22%) maize (17%) refined copper (4%) and timber (4%). The ratio of exports to imports by weight is estimated at 1.6:1 in favor of exports, thus suggesting a significant freight traffic imbalance.

280. The smallest trading partner is Cambodia accounting for 1% of Thai exports and 0.06% of imports. The ratio of exports to imports by value is 20:1 in favor of exports, but is only 6:1 by weight. Clearly there is a major transport demand imbalance. The main export commodities by weight are cement (51%), sugar (13%) and fuel (5%) and the main import commodities by weight are agricultural products which account for over 85% of bilateral trade by weight.

f. Viet Nam

281. Viet Nam is probably the second largest trading partner in the GMS region following Thailand. It is a major net exporter with its current exports being in the region of $75 billion per annum and its imports being around $35 billion, thus an export:import ratio of about 2:1. However, based on tonnage conversions the export:import ratio is estimated at around 3:1 clearly indicating a significant transport imbalance. In tonnage terms it is dependent on trade with other GMS partners for imports (70%) but most exports go out of the region with only 13% being to other GMS countries. The main exports by weight are coal (35%), petroleum (27%), rice (9%) and iron ore (3%) and the main import product by weight is cement (28%).
282. PRC is its largest GMS trading partner accounting for over 50% of its imports, though less than 10% of its exports. Contrary to the overall pattern of trade Viet Nam is a net importer from PRC with an import:export ratio by value of approximately 3:1 but 1:2 in favor of exports by weight due to the dominance of coal which accounts for almost 80% of exports. The main import traffics by weight are iron and steel products (22%), fertilizer (15%) and fuel (6%).

283. Thailand is its other major GMS trading partner accounting for 15% of imports, but only 2% of exports. The import:export ratio by value is approximately 3.4:1 in favor of imports and 4.4:1 based on weight. The main import commodities by weight are cement (40%), gypsum (16%), maize (5%) and fuel (4%) and the main exports by weight are fuel (44%) and coal (38%).

284. Cambodia is the next largest trading partner, though it only accounts for 2% of exports and less than 1% of imports. The export:import ratio is 7:1 by value but as high as 10:1 by weight, thus suggesting a major transport imbalance. The main export commodities are petroleum products (49%), iron and steel (17%) and fertilizer (9%), some of which are clearly re-exports reflecting Viet Nam’s position as a southern gateway to Cambodia. The main imports by weight are wood (37%), rubber (19%) and vegetables (17%).

285. Trade with Lao PDR is relatively minimal accounting for less than 1% of trade with GMS countries. The ratio of exports to imports by weight is 1.4:1 in favor of exports, broadly similar to the 1.7:1 by value. This suggests a traffic imbalance, but probably not significant in terms of impact on rates and traffic flows. The major imports by weight are cement (28%) fuel (21%), coal (17%) and steel (9%) and the major exports by weight are copper 44%, gypsum (23%) and timber (16%). No COMTRADE data was available for trade between Myanmar and Viet Nam. Indications are that volumes are relatively small and almost none are moving overland.
VI. PRIMARY TRADE DEMAND ROUTINGS

286. The GMS Strategic Framework in the transport sector is designed to promote the development of priority transport corridors which are critical to linking the subregion together and promoting trade and investment. This connectivity strategy is multi-dimensional involving political, strategic, tourism, pro-poor and security aspects, etc., as well as purely trade development. Thus, it should be recognized that in assessing the importance of various GMS and any non-GMS routes this report is only addressing the issue uni-dimensionally, the likely priorities in relation to the movement of international trade and that these priorities will clearly differ when being assessed from other perspectives. The potential priorities are assessed based on overall expected trade demand which includes not only intra-GMS trade, but also trade in general. This is because the transport infrastructure is a common resource.

287. Trade transport and logistics is the means of conveyance of international trade between countries; and the previous section on trade in the GMS region represents the ‘demand’ for such international movements. While both formal and informal trade moves across the GMS borders, when it comes to the more substantial formal trade flows recorded in national trade statistics the routing patterns of such traffic are not random in nature. Generally they follow a more logical pattern based on optimal service offerings – a mix of cost, time and reliability as well as mode (see Chapter V). Detailed traffic data from the various GMS borders, including sea ports, in terms of tonnage and numbers of vehicles, rail wagons, containers etc. moving would provide an accurate profile for planning purposes on how trade is moving around the subregion. However, in the absence of such information it is possible to speculate on the likely trade logistical patterns using outline trade data in the previous section which indicates the main traffic streams. The following sections examine the types and volumes of trade moving and postulates on the most likely routings and thus trade ‘demand’ along the various transport corridors.

A. Transport Modes and Routes by Country

1. Cambodia

288. Cambodia is highly reliant on trade with its immediate neighbors, especially when the sand traffic to Singapore is excluded. The major import volume traffics from Thailand are cement, petroleum and sugar which in the absence of a rail link would be most likely to be carried by coastal shipping. However, beyond these main commodities there is significant volumes of general and consumer goods, processed food and drink, much of which are likely to come from the eastern seaboard area and Bangkok conurbation and would therefore route along the Southern Corridor (AH1) through Poipet. The export volumes are much smaller and consist predominantly of basic agricultural goods, suggesting possibly a more varied routing using other smaller crossings into eastern Thailand as well as the Southern Corridor. There are likely to be appreciable volumes of informal localized trade moving across the long borderline between the two countries.

289. Cambodian trade with Viet Nam consists predominantly of imports, particularly fuel shipments. This would be expected to move using a combination of maritime and river

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58 Such as Chong Chom and Cham Ream
transport, rather than routing along the road corridors. The main import route for general goods would be expected to be the central subcorridor of the Southern Corridor (AH1). Exports are dominated by forestry and agricultural goods and consequently a greater variety of routes would be expected with traffic more split between the northern and southern arms of the Southern Corridors. Trade with PRC is expected to be almost exclusively maritime traffic routed through Sihanoukville using the Central Corridor (AH11), or Saigon Port using the Southern Corridor (AH1) and some transshipments coming through Saigon Port to Phnom Penh Port using river transport. Trade between Cambodia and Lao PDR appears relatively minimal in overall volume terms, partly due to export synergies and would probably route via the Central Corridor (AH11), though routing through eastern Thailand might be an option. Trade with Myanmar and countries outside the GMS would be expected to be similar to that with PRC with the three maritime routing options.

290. The initial assessment of Cambodian trade suggests the most important road route is likely to be the central subcorridor of the Southern Corridor (AH1) westwards through Poipet into Thailand and eastwards through Bavet into Viet Nam. In addition, the southern end of the Central Corridor between Phnom Penh and Sihanoukville (AH11) is also considered to be important especially for third country trade. The Mekong waterway link between Ho Chi Minh City (Saigon Port) is also likely to be significant, especially for lower value bulk traffics. Trade movement along the Southern Coastal Corridor, the northern subcorridor of the Southern Corridor through Siem Reap and the Central Corridor north of Phnom Penh are all likely to handle only limited amounts of international freight traffic and therefore be less of a priority.

2. **Lao PDR**

291. Trade demand is dominated by traffic to and from Thailand, especially imports. As indicated some of this trade is expected to consist of some third country trade routed into Thailand and later redistributed to Lao PDR. To a certain extent the Bangkok/Laem Chabang port complex represent the ‘gateway’ to Lao PDR as given the relatively low demand some traders hold stock in Thailand and then forward-on goods to Lao PDR as required. Exports to non-GMS countries would also be most likely to be routed through Thai ports. The overall trade profile suggests that most trade will route along the Central Corridor between Vientiane and Bangkok/Laem Chabang (AH12), mainly by road but potentially some rail on the Thai side for volume products. However, given the agricultural profile of exports links between eastern Thailand and southern Lao PDR around Pakse and the copper shipments from the south there may also be a variety of other routes for such traffic including the direct Savannakhet–Bangkok road and possibly the Pakse-Bangkok links, neither of which are GMS connections. Informal movements across the Mekong between the two countries are likely to be significant.

292. Trade with China is mainly general cargo inwards and raw materials and basic agricultural goods outbound with the higher tonnage outbound. Indications are the primary routes for such movements would be the Central Corridor between Vientiane and Boten or possibly river transport along the Mekong. Viet Nam is a relatively minor trading partner and the main flow is export movements. This trade especially is expected to use a variety of routes depending on the sources of the exports. For example, timber from the south is understood to use both major and minor routes. Probably the busiest trade route would be expected to the link Vientiane – Ban Loa using the Central Corridor (AH11) and then through Nan Phao to Vinh (AH15) or the southern route using the East-West Corridor (AH16) through Densavanah, but indications are that current volumes are low on the latter. Formal trade between Lao DPR and Cambodia is relatively small and would be expected to use the Central Corridor (AH11) or possibly transit through eastern Thailand.
293. The initial assessment of Lao PDR trade suggests that the key route is the Central Corridor western link between Vientiane and Bangkok (AH12), with much lower volumes on the same corridor north to the Chinese border. The North-East Corridor, the East-West Corridor and the Central Corridor east and south of Vientiane are likely only handle relatively small volumes of trade in comparison. The AH15 between Ban Lao to Vinh in Viet Nam could be a growing route, but still minor compared to the Central Corridor.

3. Myanmar

294. The trade data for Myanmar suggests that only a small percentage of traffic is likely to route through its land borders, as around 40% of its trade is with countries outside the GMS. This indicates that the road and rail connections with Yangon port are likely to be the most important from a trade perspective, even for traffic with its GMS neighbors. The Western Corridor which connects Yangon with its hinterland is considered to be the primary trade corridor from a national trade perspective.

295. Thailand is its largest trading partner in GMS but its exports to Thailand are dominated by oil shipments and imports by cement. The former traffic moves exclusively by sea, as does some of the latter. For general trade, the main bilateral route is considered to be the link Payagyi – Myawaddy - Mae Sot – Bangkok link using a combination of the East-West Corridor (AH1) and the North-South Corridor. Tonnage through the northern Tachileik route is expected to be significantly lower as it is mainly related to Shan State. Informal trade is understood to be significant in both directions.

296. The trade with PRC is export-orientated in terms of tonnage and consists mainly of minerals and some agricultural goods. It is considered that some of this traffic will be routed through Yangon port using maritime transport and some by river transport with the main land transport routes likely to be through Muse via the Northern Corridor (AH14) and Mongla (AH3). The profile of Yunnan Province suggests that trade demand through these land borders may be quite limited, though levels of informal trade inbound may be more significant.

297. The key transport routes for trade in Myanmar are expected to be the main roads and rail link between Mandalay and Yangon (AHI), which includes part of the Western Corridor feeding to and from Yangon Port. It is noted the road section between Meiktila and Mandalay by road and the rail links between Thazi and Mandalay are not on GMS corridors, but could be important in trade terms nationally. The next most important route for trade is likely to the road connection with Thailand through the Myawaddy - Mai Sot border. The North-Western Corridor link beyond Meiktila, the Northern Corridor and the North-South Corridor link through Tachilek and Mongla appear unlikely to be handling large volumes of international trade traffic.

4. PRC

298. The trade figures for PRC give limited guidance because the COMTRADE data is national rather than regionally based. As a result there is no specific reliable data on trade movements to/from Yunnan Province or Guangxi Zhuang Autonomous Region in isolation. Because both areas are principally agriculturally-oriented with limited industrial activity compared to further east, the volumes of trade traffic are not anticipated to be large in the context of total PRC trade. Yunnan is well known for the production of tobacco, biopharmaceuticals and some electronics, though this may not generate major tonnage movements. Another key statistic is that the GMS countries total less than 3% of Chinese trade,
which explains why the maritime trade is likely to dominate because of its connectivity with the eastern and southern seabords.

299. Thailand is PRC’s largest trading partner in the GMS area, but the majority of trade traffic would be expected to be maritime cargo moving between the PRC and Bangkok/Laem Chabang. PRC has no direct border with Thailand and thus cargo would have to transit through a third country with the most attractive route probably via Lao PDR using the North - South Corridor, especially after completion of the Houayxay – Chiang Khong Mekong River Bridge. However, indications are that this is not a high volume route, thus confirming that Yunnan - Thai trade is probably limited and consists mainly of ‘cross-border’ trade.

300. PRC has direct borders with Vietnam. The main traffic flow is inbound consisting mainly of coal which comes from north eastern Viet Nam around Ha Long. While there are understood to be some road shipments of coal through the Mong Cai border, most is shipped directly out of Ha Long to PRC ports. Exports are more varied consisting of iron and steel, fertilizer and fuel, most of which is expected to use maritime transport, particularly as the primary import demand is probably in the south of Vietnam. The volumes of trade expected to move between Kunming - Ha Noi and Nanning – Ha Noi along the two arms of the Eastern Corridor may be quite limited given the profile of the catchment area, but may include some third country traffic routed through Hai Phong port.

301. Traffic to and from Myanmar is expected to be mainly maritime with only small amounts of cross-trade between the two areas with Myanmar using the Northern and western loop of the North–South Corridor through Daluo. Traffic to Lao PDR would be mainly via the eastern loop of the North-South corridor through Mohan-Boten or by river, though volumes using this mode are understood to be small. Trade with Cambodia is expected to be predominantly direct maritime shipments.

302. The key trade corridor in the GMS area of PRC is expected to be the internal sections of the Northern Corridor between Kunming and Nanning and connecting down to Fangcheng port. However, it is recognized more research is needed to establish how trade-oriented these two areas of PRC are and the origins and destinations of such traffic in a GMS context.

5. Thailand

303. Thailand is the largest individual trading country in the GMS. However, only about 16% of its trade is with GMS countries and if PRC is excluded only 5-6% is with other GMS countries. Essentially, Thailand’s trade is carried using the maritime mode, with comparatively small volumes being carried by road, rail and air. Given this situation the key trade routes consist of the connections between the main ports and the hinterland. The trade profile suggests the main trading activity, especially in value terms, is highly concentrated around the Bangkok metropolis and the eastern seaboard between Chonburi and Map Ta Phut with rapid expansion of electronics, machinery and auto-parts manufacturing. However the North-South Corridor linking the ports with Chiang Mai and Chiang Rai and the Central Corridor connecting with eastern Thailand would also be expected to be important trade corridors with the growth in the food and agro-processing sectors outside the seaboard area.

304. The largest GMS trading partner is PRC, but the profile of goods and the GMS areas within PRC suggest that most bilateral trade will be seaborne. The North–South Corridor transiting either Myanmar or Lao represents the direct link between northern Thailand and
Yunnan, though neither area is a known as a major trade generator. This tends to be confirmed by the relatively limited traffic flows through the northern Thai borders in the past, but indications are that this is growing more rapidly, especially the link through Lao PDR. The river route is used for some bulk commodities, but water levels are considered to be a potential constraint.

305. Vietnam is the second largest GMS trading partner with trade being dominated by low value raw materials and agricultural goods. The main imports are fuel ex-Vietnamese refineries and coal, both of which are carried by sea. It is considered that over 90% of all trade with Vietnam is maritime traffic with only small quantities transiting through either Cambodia or Lao PDR.

306. While trade with Lao PDR is relatively small in relation to the overall size of Thai trade, nonetheless it is important in a regional context. The trade tends to be concentrated on Vientiane with the facilities at Nong Khai acting as a distribution center for Lao PDR trade. Given the importance of the Pakse area, in Lao PDR the second busiest route is probably through the Chonk Mek border using a non-GMS link. Smaller volumes are expected on routes along East-West Corridor through Mukdahan (A16) but also using a non-GMS link cross route from Bangkok and the A15 through Nakon Phanom. Trade with Cambodia is most likely to use land transport moving along the Southern Corridor (AHI) through the Aranyaprathet – Poipet crossing. Small import volumes may route through the smaller crossings between north-west Cambodia and eastern Thailand. The informal trade between Thailand and Lao PDR across the Mekong is indicated as significant.

307. No assessment was made of Malaysian trade and use of the southern extension of the North-South Corridor. While this is an important road and rail corridor it is known that trade volumes using this corridor rise significantly further south. The border crossings at Sadao on AH2 and Padang Besar (rail) that represent the entrance and exit to the GMS area are considered to be the busiest road and rail borders in the subregion. Much of the traffic is routed through Penang and Port Klang ports as Thailand has no west coast ports in the south.

308. As indicated the key trade corridors in Thailand are likely to be the North-South Corridor, the Southern Corridor to Cambodia, the Central Corridor to Vientiane and the Western Corridor to Myanmar. The Southern Coastal is unlikely to carry significant trade other than between the Thai eastern seaboard industrial area and Bangkok. The Southern Corridor west of the North-South Corridor junction, the East-West Corridor and Northeastern Eastern Corridor are considered unlikely to carry much international trade traffic. There are two non GMS corridor links to Chong Mek and Mukdahan which are important for Lao PDR trade, but volumes are unlikely to be sufficient to justify priority status.

6. Viet Nam

309. The international trading activity in Viet Nam tends to be concentrated around the Mekong Delta in the South and the Red River Delta in the north. The overall trade profile suggests maritime trade will dominate especially through Saigon Port in the South and to a lesser extent Hai Phong in the north, plus the coal shipments out of Ha Long. Movement of trade though the land corridors is considered to be relatively small by comparison, even along the Eastern Corridor, as goods tend to be shipped in and out directly rather than imported and then sent north or south inside the country, or in the case of exports sent to the other end of the country to be exported. The growth of Saigon Port reflects the high growth and importance of trading activities in the south of the country and its future potential as a maritime hub.
310. PRC is Viet Nam’s largest GMS trading partner. As indicated exports are dominated by coal exported from Ha Long with smaller more localized coal shipments likely through the Mong Cai border. The dominant import flows are expected to be from PRC’s eastern and southern seaboards to the south of the country and this would be expected to be almost exclusively by sea. A similar situation would be expected in the north using Hai Phong port. Traffic from Yunnan through Lao Cai and from Nanning through Lang Son borders are not considered to be significant in terms of overall tonnage, given the profile of the potential catchment area on the PRC side. Initial indications are that both rail and road cross-border traffic is about 1 million tonnes per annum out of around 30 million tonnes of bilateral trade. Nonetheless the Lao Cai – Hai Phong western arm of the Eastern Corridor is probably a priority for bilateral trade.

311. Thailand is the next largest market and is dominated by the movement of raw materials and fuel. It is expected that most of this will go be sea as the cost of land transit through Cambodia or Lao PDR would be significant for these types of product. For the movement of higher value products again most would be expected to travel by container by sea, but some movement would be anticipated along the Southern Corridor to/from Ho Chi Minh City and lesser amounts to/from the north, probably through the AH15 link.

312. Cambodia is not a major trading partner, but overall volumes, especially of exports are important. The major flow is fuel ex-Vietnamese refineries which would use maritime or river transport, as would much of the steel and fertilizer. The trade that moves by land would probably mainly transit through the Moc Bai border on the Southern Corridor, including some volumes of third country trade being routed through Saigon Port. The timber imports are more likely to use the northern arm of the Southern Corridor and a variety of small border crossings. Trade with Lao PDR appears to have a similar profile with traffic spread over a variety of border crossings. Trade with Myanmar is expected to be almost all maritime traffic.

313. The most important trade corridor in the south is Eastern Corridor 200 km north and south of Ho Chi Minh City feeding traffic to and from Saigon Port and the Southern Corridor AH1 connecting with Cambodia. In the north the most important link is the Ha Noi - Hai Phong extension of the Eastern Corridor. The next important corridor is the road/rail link between Ha Noi and PRC through Lao Cai and the Long Son road links, but these would be expected to contain much less trade traffic. The Eastern Corridor between Ha Noi and Ho Chi Minh City is a critically important domestic freight corridor, but probably carries only limited amounts of international trade. The East-West, Southern Coastal and northern arm of the Southern Corridor are not considered to be significant trade routes.

B. Impact of Future Changes in Trading Patterns

314. There are numerous economic and trade studies looking into the future and it was not intended that this initial transport assessment should include trade forecasting. However the GMS area is a dynamic region and improvements in transport infrastructure take several years to implement. Consequently it is important to identify issues which could potentially affect future trade routings. Probably the major subregional change will be the introduction of ASEAN Economic Community due to be launched in 2015. This will tend to promote intra-GMS trade by means of simplified trading and border procedures. At this stage its impact is unknown, but it would be expected to generate increased land transit traffic movements between member states using existing routes, rather than impacting on one route in favor of another. Despite this trend, it is still considered that the maritime mode is likely to remain dominant in trading for the GMS countries not only for third country trade but in some cases for intra-GMS trade.
The second major change which will impact on the subregion is the expected developments in Myanmar, which should result in a significant increase in trading activity in that country, particularly when international sanctions are lifted. The effect of these changes is not clear at this stage, other than increases in overall traffic levels in that country, thus suggesting more traffic moving on existing routes. Again, the maritime mode is likely to be dominant but the land link between Myanmar and Thailand at the eastern end of the East-West Corridor would be expected to become appreciably more important than at present with much greater volumes. This is because the land route between Bangkok and Yangon, when developed, could become increasingly competitive with the all-sea route.

In Thailand there is concern in the medium to longer term regarding rising labor costs versus its competitors in Southeast Asia. Increases in the minimum daily wages and other related costs are creating pressures on export industries to downsize or relocate away from the current industrial concentrations. The latter could lead to either moving production further inland in search of cheaper labor, such as is occurring in PRC, or alternatively attracting additional lower cost labor from inland to gravitate towards the major seaboard production areas. To date the latter strategy of labor mobility has prevailed suggesting that the transferring of export production processing zones inland towards the north, east or south of the country is likely to be a slow gradual process. This trend suggests that minimizing trade logistics costs is considered more important than labor costs and stresses the importance of keeping industry close to the gateway ports. The current concentration of trade demand around Metropolitan Bangkok and the Eastern Seaboard is therefore not expected to change soon.

In Vietnam the concentration of trade activity in the south versus the north is expected to continue despite recent industrial expansion in the Red River Delta area. The growth of Saigon Port which will be able to handle larger container ships will potentially mean further improvements in maritime connectivity using ‘mother ship’ calls as opposed to feeder vessels. This will also increase its attractiveness not only as a manufacturing center, but as a ‘gateway’ to Cambodia.

As regards PRC the key issues are likely to be whether PRC is interested in using Hai Phong port as opposed to transiting longer distances to their own ports. At this stage high growth on the Kunming – Hai Phong route appears questionable due to the limitations of Hai Phong meaning it only has feeder port status. PRC has been investing on strategic road and rail linkages with Lao and Myanmar, but the debate is likely to be whether this will generate significant volumes of new trade or be used to carry existing levels of trade more efficiently. At this stage no major changes in trade traffic are foreseen in relation to Lao PDR and Cambodia, other than Saigon Port competing more with Sihanoukville.

It is noted that the priority corridors on the basis of trade-related ‘demand’ tend to be those with ‘gateway’ ports. This is in part due to reliance on the maritime mode for trade logistics in the subregion and that ports generally handle large volumes of traffic. However, the importance of that port in terms of its international connectivity impacts upon the ‘demand’ to use particular transport routes. This is examined in more detail in the next chapter, but explains why the East-West Corridor has low priority from a trade perspective compared to the Southern Corridor which runs almost parallel. The dominant general cargo seaports in the GMS region are likely to be Laem Chabang and Saigon with secondary level ports at Hai Phong, Sihanoukville and Yangon.
VII. LINKAGE BETWEEN ASSESSMENTS AND DEVELOPMENT OF TRADE FACILITATION ON GMS CORRIDORS

320. The overall objective of the study is to undertake initial assessments of transport infrastructure (Chapter II) and transport and logistics services (Chapters III and IV) and to identify the main trade flows (Chapter V) and key routes (Chapter VI) and from these assessments identify key trade facilitation needs in the GMS countries and along their transport and economic corridors. This chapter seeks to link those assessments with the trade facilitation requirements in its broadest sense of helping to develop trade. The main emphasis is on ‘hard’ infrastructure elements, but some reference is also made to the ‘soft’ infrastructure aspects.

321. The focus is on development of international trade, either intra-subregion or external. There may be multiplicity of strategic, political, touristic, domestic and other reasons justifying development of the transport infrastructure in the GMS. Thus, it is important to stress the unidimensional nature of this assessment and therefore its potentially inherent bias in identifying priorities. However, development of trade, whether intra-subregional or external, is a key goal of the GMS initiative and the establishment of the Asian Economic Community (AEC) in 2015 is expected to not only stimulate intra-subregional trade, but to also theoretically make transit movements easier. Consequently improvements in trade connectivity involving both trade facilitation ‘hardware’ and ‘software’ improvement will be critical in supporting overall trade growth in the GMS.

A. Time and Cost Structures

322. The study was specifically requested to assess the relative time and cost structures underlying the trade flows and their routes. Under the transport assessment (Chapter III) the importance of service standards with the balance between cost, time and reliability are shown to be the critical factors, but that the balance between these changes according to the type of trade to be moved. Lower value commodities will generally always orient towards the cheapest method of transport being prepared to sacrifice and reliability as inventory savings gained from these two parameters would be minimal. For higher value manufactured goods such as electrical goods, the cost of inventory is high and the likely transport costs as a proportion of the final price is low, so speed is more important. Modern advanced logistical systems tend to be strongly oriented towards reliability as the key parameter, especially when dealing with multi-site production and assembly networks and multinational companies.

323. Analysis of many previous GMS projects suggest a simplistic approach has been adopted whereby the trade has been measured on the basis of overall trade in value terms without any assessment of weight and types of product to be moved. Thus, it ignores the likely physical demand for transport (tonnage) and that different types of traffic will using different modes and routings based on the optimal C/T/R parameters for that product. A macroeconomic ‘top down’ approach is commonly used as opposed to a micro-economic ‘bottom up’ methodology.

324. It is considered from a transport perspective that there may sometimes be an over-reliance placed on one parameter – speed. In many cases the economic justification made for development of transport infrastructure is largely based on savings in time. This relies to a major extent on a developed country mentality of ‘time is money’, but in many cases this does not necessarily apply in the GMS environment. For example, road transport costs consist of a
mix of fixed and variable elements. The main fixed costs are the capital costs associated with the vehicle and driver wages and these are largely time-based. The main variable costs are fuel and maintenance/repairs and are predominantly distance-related. In developed countries with modern vehicles and highly paid drivers the fixed costs are high and so time incurs high costs. Thus, short journeys are expensive in terms of ton/km as the tariffs are predominantly time-based. Longer journeys become cheaper in terms of ton/km and increasingly become distance-based.

325. In the GMS region the transport sector is dominated by small operators with older vehicles, thus they tend to have low fixed costs. In such an environment the value of time becomes increasingly less important in charging terms. The saving of 1-2 hours on a journey or at a border in reality will have a negligible impact on rates and thus time savings do not have necessarily promote trade through lower transport charges. As transport vehicles are gradually modernized and fleet operators gain a more significant part of the transport market, the fixed cost elements would be expected to rise and thus such time savings will start to have more impact on charging structures that currently exist.

326. Another key aspect which needs to be considered when examining the time and cost structures, is the relative efficiency in terms of vehicle utilization and load factors. The first and possibly most important constraint in the GMS is the significant imbalance in much of the intra-subregional trade. For example, Thailand exports much more to all of its immediate neighbors than it imports. Similarly, PRC exports more than it imports through its GMS borders, as does Vietnam to Cambodia. This often results in high levels of non-revenue earning empty running in one direction. It may also mean longer waiting times to find a return load or diverting to find domestic traffic to generate revenue for the return journey. In these situations there is a tendency for transporters to charge round-trip costs for the outbound journey or at least ‘load’ the outbound rate to include some of the return costs. It can be seen therefore that while costs are based on a combination fixed and variable costs, the actual charges on routes are not necessarily linear in terms of distance or direction.

327. Another important issue is the effect of imbalances between supply and demand. This problem is most common at the major gateway ports, but also occurs at many of the border crossings where there is often an oversupply of transport. This is manifested in the form of queues of vehicles parked up awaiting loads or more commonly waiting to try to find a load. These waiting times often exceed the actual journey time. Thus, it can again be seen that the benefits of time saving by improvements in road infrastructure or border procedures may be less critical than improving transport efficiency in other ways.

328. The role of maritime transport is often poorly understood institutionally. As indicated sea transport tends to be non-linear in that the charges are not distance-related. The effect of having larger ships on longer distance routes mean that the cost per unit carried per km on a large mainline vessel is probably less than that on a short distance feeder vessel. The reality is that shipping costs in the form of charges made by the carriers is driven more by market forces than simple vessel costs. Shipping lines charge on a port-to-port basis where distance becomes almost irrelevant. Much more significant is traffic flows. For example, flows into PRC are much lower inwards than outwards, which mean the carriers need more containers in PRC for their exports than they have inward units going in. Thus, inward rates into PRC tend to be lower than outward, as the carriers ‘encourage’ or ‘promote’ inward shipments and in the outbound rates cover for part of the container repositioning costs. In the GMS region tariffs are also subject to seasonal factors whereby rates often rise later in the year as demand for movements of consumer goods rises for the Christmas and New Year season, whereas rates in
the middle of the year are lower because of the impact of annual holidays in the developed countries of the northern hemisphere and thus lowers demand.

329. It can be seen the transport market is more complex than a simple time and cost structure and that transport costs are not necessarily the same as transport charges. While there is an overall relationship between costs and charges this is an indirect rather than direct relationship. A number of GMS studies have used a variety of time/distance models such as that shown in Figure 7.1. These usually show a similar pattern suggesting that time delays at borders are the most critical factors, rather than the travelling time (shown as the vertical lines). Infrastructure development will have the effect of raising the average speed (reducing the steepness of the slope) but unless the infrastructure improvement is over a long distance or the road was particularly bad, the savings tend to be low by comparison with ‘soft’ infrastructure enhancements at the border. The implication of these studies suggests that improvements in ‘hard’ infrastructure in the form of road development are much less important than the ‘soft infrastructure’ of improving border processing performance and eliminating transshipment. This bias tends to exist because of the possible overemphasis on time as the key cost factor. In practice the improvements in ‘hard’ infrastructure are probably just as important to the transport or logistics operator and should have an impact on rates. In terms of trade facilitation it is transport charges that are relevant, rather than transport costs as this is what the traders ultimately have to pay in their trade transactions.

Figure 7.1 – Typical Cost/Time/Distance Model

[Diagram showing Cost/Time/Distance Model]

Source: The GMS East West Economic Corridor Logistics Benchmark Study (2008)
330. Border crossings will almost always represent a significant bottleneck due to the procedures of the border authorities. However, this is sometimes exacerbated by the need to tranship due to restrictions limitations on through-transport, gauge changes and the use of certain trading terms. While there are individual cases where physical border infrastructure can be improved/upgraded, the impact of such investment being reflected in lower charges may be limited. The highest returns are likely to be in the ‘soft’ infrastructure aspects of simplification and harmonization of documentation and procedures, use of risk management inspection and examination systems, post auditing, increase automation etc. as well as resolution of vehicle access agreements under the CBTA.

B. Mapping of Corridors

331. In corridor mapping from a trade facilitation perspective it is important to stress that transport and logistical services are service providers responding to demand. Consequently, the initial trade demand analysis undertaken in Chapter VI is the most critical input. In this section each of the GMS corridors is assessed from a transport and logistics provider perspective to help identify both where the primary trade demand lies and where there are potential constraints which represent barrier to either trade of transport performance. The mapping exercise concentrates predominantly on the ‘hard’ infrastructure which represents the trade routes being used by the international transporters and 3PLs.

332. The Terms of Reference suggested that the trade routes should identify their relative shares in terms of total trade. There are a number of reasons why this has not been undertaken. Firstly, there is no consistent data collected on trade passing through the GMS borders, though outline data is available on a few but only in relation to when a specific study was undertaken that involved that crossing. Secondly, in most countries the traffic passing
through the land borders is minimal, compared to that moving through the ports to and from external markets. Thirdly, it is not clear whether share relates to value regarding trade demand or tonnage which relates to transport demand.

333. The ongoing TA 7557: Promoting Regional Infrastructure Development project has attempted to model the international trade flows in Asia, including those in the ADB region. This was intended to be used as a tool in identifying potential infrastructure priorities on the Asian Highway and trans-Asian Railways networks. The modeling maps for the GMS region are shown in Figure 7.2 and 7.3. These were designed to help identify the busiest international road routes on the basis of scale of trade activity, rather than actual numbers (though estimated numbers were used within the modeling process and are shown in Appendix 1).

**Figure 7.2**

Annual Tonnage in GMS with International Traffic

Source: ADB TA 7557: Promoting Regional Infrastructure Development project
In the corridor mapping under this study a similar approach has been used by identifying the likely ‘busiest’ sections of the various corridors from a trade perspective based on information from previous studies and discussions with transporters. No attempt has been made on quantification or comparing one corridor versus another. The analysis in Chapter V provides some indications of intra-GMS volumes, but it is clearly more difficult to identify trade movements within a country after it has cleared at a port or border in the case of imports and the origins of export movements.

1. **North - South Corridor (NSC)**

From a trade facilitation perspective this is probably the most important trade route with having the heaviest demand. The key section is at the southern end as it gets closer to Bangkok and links in with the eastern ring road connecting through to Laem Chabang. As the route travels further north beyond Tak trade volumes decline. In the central section of the corridor the eastern ‘loop’ between Thailand and PRC passing through Lao PDR is considered more important than the western link which involves more transshipment and problems transiting through Myanmar. The link between Mohan and Kunming has trade, but given the reliance on border market trading most southbound ‘trade’ traffic from Kunming is in reality a domestic movement to the border area.
The main constraints on this corridor relate to the middle section between Chiang Rai in Thailand and Boten in northern Lao PDR. The Thai section between Chiang Rai and the border at Chiang Kong is still under construction, thus lowering average driving speeds. However, the major problem is the river crossing at Chiang Kong in Thailand to Houayxay in Lao PDR across the Mekong River. Trade movements are via the ferries or transshipped or loaded onto river transport. The $47 million Fourth Mekong Friendship Bridge is under construction and when completed in 2014 will remove the last remaining obstacle to road transporters. At that stage it is expected the Mohan border will become an important transshipment center between PRC and Thai vehicles, either cross-docking or via the border market system with intermediate storage.

However, it is important to note the trade traffic on the northern and central sections are expected to be light compared to the southern end. This is because of the heavier import and export demand relating to Thailand’s non-GMS trade being around the Bangkok conurbation and along the corridor to the north of the city and the role of Bangkok and Laem Chabang as gateway ports. In addition, the majority of the Thai bilateral trade with PRC is expected to continue to use the maritime route, mainly because of the areas of demand being along the seabords in both countries. Completion of the corridor through Lao PDR would be expected to generate new demand, particularly relating to cross border trade, but major long distance road traffic flows between Bangkok and Kunming are not expected due to the high costs. Some transfer of traffic from inland waterway transport to the road mode is likely once the bridge is completed and transport becomes more efficient through Lao PDR.

The southern extension from Bangkok to the Malaysian border has some trade movements at the northern end feeding to and from Bangkok, but this falls off rapidly as it travels south but starts to build up again south of Surat Thani. Due to the lack of a Thai west coast port and limitations on development at Songkhla Port, exports from southern Thailand are routed through the Malaysian ports of Penang (Butterworth) and Port Klang. Much of this traffic is taken by road to Sadeo and transferred to road vehicles for transport to Penang or to Padang Besar where it is loaded onto rail wagons and dispatched to either port. In addition, there is some bilateral trade most of which is road-based.

This southern extension is theoretically a multimodal link. However, much of the rail track is single line limiting its capacity and the line has to be shared with passenger services. It is noted that cargo is trucked down to Padang Besar rather than loaded much further north in Thailand. Thus the key rail constraints are lack of train paths, the potential to use through wagons and the poor overall image of the railway in Thailand. There are plans for double tracking the whole section, but the other issues will also need to be addressed.

The road between Hat Yai and Sadeo/Padang Besar becomes increasing congested towards the border as it passes through populated areas and especially at the border. There are two key constraints. Firstly, the lack of a through-transport agreement means that transshipment has to take place, either truck to truck or truck to rail. It is understood that a few regular transporters double register their vehicles to eliminate the need to transship, but their overall market penetration is small. The second problem is the major imbalance with most traffic being southbound, especially rubber and parawood. This results in many vehicles waiting around to try to obtain northbound loads. This congestion is compounded by waiting passenger transport.
341. The priority would appear to be an effective through-transport agreement combined with development of the border infrastructure including the access road and waiting areas. Even with a through-transport agreement transshipment is likely to continue as a feature at this border because of the distances to be travelled on the Malaysian side combined with the imbalance and the rail transfers. It may be that further infrastructure investments are needed at both Sadao and Padang Besar to resolve the border congestion issues. This is the busiest border crossing in GMS handling over 1,000 trucks a day in each direction, so the economic case for its improvement should be strong.

342. There are proposals for a new motorway between Hat Yai and Sadeo using a more westerly alignment which would avoid many of the populated areas. This would be beneficial in time savings by enable faster average speeds, but may have little impact on likely transport charges given the relatively short distance and the much larger problem of congestion and delays at the border.

2. Eastern Corridor (EC)

343. The trade-related activity on this corridor is concentrated in the south in the environs of Ho Chi Minh City and in the north radiating out from Ha Noi. The link between Ha Noi and Ho Chi Minh City AH 1 is important domestically, but trade activity tends to be concentrated around the two deltas rather than moving between them. The most important link in the north is between Ha Noi and Hai Phong handling external trade passing through the port. The next important link is between Ha Noi and Lao Cai, currently under development by ADB. This is considered to be important in the context of bilateral trade with transshipment at the PRC border Hekou. This link is also a rail corridor, though the line on the PRC side has yet to be reopened and the link between the border and Ha Noi is mainly used for apatite cargo (used in the manufacture of fertilizers). In addition, there is the north-eastern spur between Ha Noi and Nanning, but it is understood freight volumes on this route are significantly less than through Cat Lai. All three spurs link out from Ha Noi and are currently under further development and on completion this should eliminate any ‘hard’ infrastructure constraints.

344. A key consideration is the potential to route Kunming traffic through Hai Phong port. This logistics strategy is included in the case for the development of the Lao Cai – Ha Noi motorway link, though it included other traffic flows. The case for Chinese exports and importers to use Hai Phong appears weak. There are several key reasons for this. Firstly PRC sells its exports predominantly on the basis of ex-border warehouse or more commonly FOB Chinese port. If the exporter were to use Hai Phong port he would have to persuade the overseas importer to take delivery at the Hekou border or sell ex-Hai Phong accepting the transit cost across Viet Nam. Neither possibility looks easy and is not compatible with PRC policies at other land borders. Secondly, Hai Phong suffers from draft problems which indicate it will remain a feeder service port for the foreseeable future. This places it at a disadvantage compared to Shenzhen and Hong Kong ports. Indeed many of the feeders calling at Hai Phong hub out of these ports. Thirdly, the extra facilitation costs of transiting through another country compared with a domestic movement within PRC suggest that any distance advantages would be neutralized by these extra costs. The conclusion is there may be some traffic, but possibly not the major flows suggested by some previous assessments.

345. It can be argued from a transport and logistics perspective that the lack of through-transport through the PRC borders is a potential barrier to trade. This system of selling from border warehouses or ex-transport vehicles at the border contains overall transport
inefficiencies. This trading approach is used at all PRC land borders with restrictions on access by foreign vehicles beyond these designated border markets. Chinese vehicles do transit into neighboring countries, though usually on a restricted basis. However, it can also be argued that traders prefer this system as they do not have to concern themselves with internal transport and border costs within PRC, thus making it easier to trade. There appears limited pressure from traders to change the system within the foreseeable future.

3. East – West Corridor (EWC)

346. This is not considered to be an important corridor from a trade logistics perspective except at the western end linking Thailand with Myanmar. Current trade is restricted by sanctions and difficult economic conditions in Myanmar, as well as complex logistics involving significant use of non-transparent approaches. The damage to the bridge between Mae Sot and Myawaddy results in the imposition of a 12 ton weight limit, thus excluding heavy transport crossing. Most traffic passes though the 25 river ports/quays and is reloaded onto local transport for distribution within Myanmar.

347. The major constraint at the moment is the damaged bridge, combined with the lack of a through-transport agreement. Currently it is difficult to obtain reliable consistent rates and therefore much of the traffic is considered to change ownership at the border by use of ex-border trading terms. There are also significant issues over whether the trade is formal and informal. The ‘soft’ infrastructure of border processing and transport agreements in Myanmar will need to be addressed as a priority as Myanmar ‘opens up’ to external markets, particularly as trade with Thailand is expected to expand rapidly and addressing these non-tariff barriers would be expected to facilitate this bilateral trade.

348. The main hard infrastructure issue, other than the bridge, is the road inside Myanmar. Though Thailand funded the first 17 km this is in a poor state and needs rehabilitation as does the AH 1 all the way to its connection with the main north-south road at Payagyi. Part of this road is one direction one day and the other way the next day, thus increasing transport costs. The important trade corridor is from the border to Yangon, rather than the current routing to Mawlamyine which has negligible trade potential. It is understood that the road from the border to Kawkareik and the bridge repairs will be funded by the Government of Thailand, but this still means that the poor road between Kawkareik and Payagyi will continue to be a constraint. From a trade facilitation perspective this is considered to be the priority ‘hard’ infrastructure development on this corridor. While part of the road between Tak and Mae Sot is only two-lane in the hilly section this should not be a major constraint as the average driving speeds are already restricted over this section due to the nature of the terrain.

349. West of Phitsanulok the route carries limited volumes of trade with low traffic levels through the border crossings. The major reasons for this situation are the low demand with no significant centers of demand/conurbations and Da Nang is only a small port with limited maritime connectivity and thus is not a ‘gateway’ port to this corridor. While there are developments taking place to establish border special trade zones etc. it is considered unlikely that this part of the corridor will develop into an important trade route, given its current and potential future demand profile. It is not considered that resolution on outstanding ‘soft’ infrastructure issues would have any real impact.
4. **Southern Corridor (SC)**

350. This is an important trade corridor between Bangkok and Ho Chi Minh/Vung Tau. The major trade flows are expected to be between Bangkok and the entry to the 359 road being upgraded by ADB and the connecting link roads down to Laem Chabang. This is because it forms part of the eastern seaboard and has significant numbers of export industries. From the 359 eastwards the trade volume drop significantly and is restricted to bilateral trade passing through the Aranyaprathet - Poipet, mainly destined for Phnom Penh. The link between Phnom Penh and Ho Chi Minh through Moc Bai is becoming increasingly important as Saigon Port develops. The heaviest volumes in the Vietnamese section are around Ho Chi Minh City and the new container areas out towards Vung Tau.

351. This route has significant ‘soft’ infrastructure issues, especially the transport arrangements which result in transshipment at the land borders. From June 2012 Thai transport will be allowed into Cambodia and vice versa but on a restricted basis (only 40 permits including buses). Vietnamese transport can enter Cambodia and vice versa with the number of permits being gradually increased to 500. It is clear that in the short term there will be insufficient permits to cover the trade growth and border transshipment will continues as a feature, particularly at the Aranyaprathet – Poipet border. It is unlikely that Thai vehicles will transit all the way through to Vietnam and vice versa as Thai trucks are right hand drive and both Cambodia and Loa PDR trucks are left hand drive. There are indications that competition for services between Aranyaprathet and Phnom Penh may be limited due to the connectivity between the main operators.

352. The ‘hard’ infrastructure is less of a constraint. The major problem is the road to the east of Phnom Penh to Neak Luong and the bridge over the Mekong River at Neak Luong. The road is being upgraded by ADB and the bridge is already under construction. Thus, the road infrastructure constraints are being addressed and should be resolved soon. This would be expected to result in more trade on the Phnom Penh to Saigon Port, particularly as the port further develops and starts to handle more mainline vessels. The need for more permits confirms that demand on this route is high. There is congestion through Phnom Penh with proposals for a ring-road. The trade moving along the corridor tends to be to and from the city, rather than just passing through. There is unlikely to be significant road freight traffic from Thailand to Ho Chi Minh City as most trade uses the maritime connection. Development of the bypass may be important domestically, but would be unlikely to have any real impact on trade development.

353. There is already heavy congestion at the Aranyaprathet – Poipet border which will become a more serious issue as bilateral trade expands. The basic problem is the mixing of passenger and freight traffic and the high volumes of passenger traffic to the casinos, together with their positioning. There is a clear need to separate the two traffic streams by means of a separate freight crossing, a similar strategy to that adopted by Thailand with its border crossings to Myanmar. This is considered the priority development on this corridor from a trade facilitation perspective.

354. The western section between Bangkok and Kanchanaburi would be expected to handle some volumes of Thai trade, but west of Kanchanaburi the volumes become negligible. The key issue is whether Dawei Port will generate major trade flows acting as a westerly gateway port. Indications are that Dawei will principally be a heavy industry port and is most unlikely to attract container traffic. The northern subcorridor of the Southern Corridor through Siem Reap
in Cambodia to Cuy Nhon in Viet Nam is not considered to be handling significant trade flows and Quy Nhon does not possess the potential to become a gateway port.

5. Southern Coastal Corridor (SCC)

355. The Southern Coastal Corridor is not considered to be trade corridor other than at the western end along the Thai seaboard. The only significant restriction at the moment is the poor connectivity into Laem Chabang Port which has been expanding faster than the supporting road network in the immediate vicinity of the port.

6. Central Corridor (CC)

356. The Central Corridor runs south from the PRC border to Vientiane and then splits into an eastern arm running south into Cambodia and a western arm into Thailand. The section north of Vientiane is not a major trade corridor, mainly due to the limited bilateral trade between Lao PDR and PRC. The main trade corridor is the western arm, though possibly not with the current alignment. Indications are that a high percentage of trade is between Bangkok and Vientiane, including external trade as importers prefer to use Bangkok Port as a gateway rather than Laem Chabang. The reasons for this trend is not clear, but it may relate to lower transport rates and that the cargo has to be unstuffed due to the traffic imbalances. Thus, the primary trade route is probably Vientiane – Nakhon Ratchasima – Bangkok.

357. On this corridor the main issues relate to Nong Khai. Under the CBTA Thai vehicles can enter Loa PDR, though there is a difference in axle load limits. In practice Thailand often uses heavy transport to Nong Khai and smaller Lao trucks come over the river from Vientiane and undertake the delivery inside Loa PDR. In effect, Nong Khai is acting as a distribution center for that part of Lao PDR. While this approach is inefficient in transport terms it can be argued logistically this system works well, especially given the very high percentage of bilateral trade. The road connection is understood to be good, but the parallel rail connection is not used to any great extent to carry international freight. This suggests there are no significant ‘hard’ infrastructure constraints, though there are some minor residual for ‘software’ constraints.

358. The eastern arm has low levels of trade mainly because trade between Cambodia and Lao PDR is low. This arm only becomes a significant trade corridor south of Phnom Penh with the connection through to Sihanoukville. Unfortunately, this port is only served by feeder vessels and therefore is facing increased competition from the Southern Corridors. Forwarders are indicating that from Phnom Penh it is cheaper to use Saigon port than Sihanoukville.

7. Northern Corridor (NC)

359. The northern corridor is only considered to be a trade corridor east of Kunming, particularly on the Kunming-Nanning section. International trade moves along this multimodal corridor but it is understood most continues on eastwards to the gateway ports of Shenzhen and Hong Kong. Fangcheng is predominantly a bulk port and therefore the rail connection is important, but handles little general cargo. There are no ‘hard’ or ‘soft’ infrastructure issues on this section as the roads are good and there are no international border crossings.

360. The western section connecting Kunming with northern Myanmar is understood to carry only limited amounts of bilateral trade. This is mainly because the northern part of Myanmar has low demand and the corridor is competing with the more important North-South Corridor. The connection through to India through Muse is unlikely to become an important trade route.
between PRC and India, mainly because Kunming is not a major export generator or import consumer and the North-east States of India are still over 1,000 from any significant center of demand (Kolkata). This is seen more as a strategic link, rather than an important trade corridor.

8. Western Corridor (WC)

361. The Western Corridor is considered to be an important trade corridor for Myanmar, but possibly not with the current alignment. The important trade corridor is between Yangon – Naypyidaw – Mandalay, with Yangon and Thilawa ports acting as ‘gateways’. The road link between Payagyi and Mawlamyine has been addressed as part of the East-West Corridor (see section C above). It is understood the main road between Yangon and Mandalay is generally in good condition and lightly trafficked. Any ‘hard’ infrastructure issues are likely to be at the southern end in and around Yangon and the connection to the port at Thilawa. If the current policies continue and sanctions are lifted it is likely that more port development will be a priority and this will require both public and private sector development. In addition there will be a need for supporting container freight stations and inland clearance depots.

362. The section of the corridor between Meiktila and the Indian border at Tamu is unlikely to be a major trade corridor for the same reasons at those given relating to the Northern Corridor. This section of the corridor passes through very difficult terrain and is subject to severe flooding and erosion problems. Transporters charge high rates for this section given the risks. As indicated this is considered to be more of a strategic link rather than a trade corridor.

363. The central section of the corridor is multi-modal due to the rail line between Yangon and Mandalay. This is double tracked, but due to its poor condition it is understood there are speed restrictions. The role of rail in the development of trade within Myanmar will depend on its port connectivity, improving reliability and where ‘block’ train operations can be viable.

364. Generally clearance arrangements are not to international standard and are non-transparent at this stage. The ‘soft’ infrastructure issues center around the need to modernize clearance procedures in line with the recommendations of the Revised Kyoto Convention and to introduce higher levels of automation among border agencies at the ports. It is considered that external assistance will be required to address these areas of concern.

9. Northeastern Corridor

365. The North Eastern Corridor is not considered to be a trade corridor and in reality is not even a transport corridor at this stage. It is more a theoretical road link between locations with low or negligible trade demand. To the transport and logistics community it may appear illogical, especially as there is the major gap between Luang Prabang and the junction with NR 1C near Meung Hiem.

10. Other trade linkages

366. The only other possible trade corridor that is not allied to a GMS corridor is the link between Bangkok and Pakse in Lao PDR via Nakhon Ratchasima. There are indications that the Pakse area of southern Lao PDR could generate increase trade activity, albeit at a relatively low level compared with some other routes due to Loa PDR’s low trade activity compared to other countries.
11. Key Trade Routes

367. The primary trade logistics routes in the GMS are considered to be as follows:

- Trade Route 1: North - South Corridor via Lao PDR (AH2/AH3), especially close towards the southern end near Bangkok/Laem Chabang;
- Trade Route 2: Southern Corridor between Bangkok and Ho Chi Minh City via AH1, especially on the Thai and Vietnamese sections;
- Trade Route 3: Central Corridor between Bangkok and Vientiane via AH2;
- Trade Route 4: Yangon - Mandalay route (AH1), incorporating the Payagyi - Meiktila section of the Western Corridor;
- Trade Route 5: Bangkok - Payagyi via Mae Sot – Myawaddy using combination of North – South and East – West Corridors (AH1);
- Trade Route 6: Northern Corridor between Kunming and Nanning;
- Trade Route 7: Eastern Corridor between Kunming and Hai Phong via AH14; and
- Trade Route 8: Central Corridor between Phnom Penh and Sihanoukville via AH11.

These primary trade routes are shown in Figure 7.4 overleaf.

C. East Asian Linkages

368. The study was requested to identify and prioritize measures in other transport modes in the context of a multi-modal approach to strengthening transport links between GMS and South and East Asian countries. As regards the connectivity with the East Asian countries the dominant transport mode will remain maritime transport, as all of the countries have most of their import demand (population, spending power) and export demand (manufacturing centers) along their seabords and in some cases are island economies. Road transport will only relate to connectivity with PRC, which had been addressed above. Theoretically the removal of road transport restrictions to allow through-transport into PRC beyond the GMS area would be beneficial, but this is considered unlikely and there appears to be no pressure from the trading community for change.

369. Rail transport to PRC is considered only practical in the case of connectivity between GMS and southern PRC. Assuming a through link was commissioned the potential for long distance freight transport by rail will tend to diminish with distance in favor of maritime transport. For example while there are proposals for the Kunming-Singapore rail link, the route in its totality is of no interest to the transport and trading commnute in its totality as the combined link involving maritime and rail transport in PRC would be infinitely more attractive and cost effective. To the trading community the value of this initiative is in the movement of goods along certain sections of the rail link rather than between its termini. Similarly, the further the rail journey extends into PRC the less likely that rail will be competitive with combined transport using PRC ports, other than to western PRC which has a low demand compared to the south and east.
Figure 7.4: Primary Trade Corridors in GMS
Maritime connectivity is generally satisfactory between GMS ports and East Asia. While GMS has no hub ports, because the size of mainline vessels on the SE Asia-East Asian trade are smaller there are direct services from Laem Chabang and Saigon and regular services from with Bangkok, Hai Phong, Sihanoukville and Songkhla to Hong Kong and from there to all the main East Asian ports. Containers between Myanmar and East Asia will probably transship at Singapore with Colombo as an alternative. From a logistics perspective the reliability of these services generally means it is possible to build the slower speed into the supply chains in order to gain the lower transport costs.

The connectivity with South Asia is more problematical. Other than some cross border trade the volumes of trade passing through the existing land borders is minimal. This landbridge routing involves transit through Myanmar which has not been easy with the need for multiple transfers at the borders and it is evident that the road mode is not competitive over these long distances. The North-East States of India are predominantly hilly with an agricultural economy, mainly tea. Basically this is not an area with any significant import demand and any export produce is sent to the main part of India for added-values services prior to export. Thus, when looking at connectivity between the two subregions Kolkata is the first major center of demand at the western end. The BIMSTEC Transport Infrastructure and Logistics Study (BTILS) examined the connectivity between South and East Asia and calculated the transport options on a variety of routes including the Bangkok – Kolkata link. The calculations are shown below in Table 7.1.

<table>
<thead>
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<th>Departure and arrival destinations</th>
<th>Time (hours)</th>
<th>Distance (km)</th>
<th>Cost ($)</th>
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<td>632</td>
<td>4020</td>
<td>2325</td>
</tr>
<tr>
<td>Bangkok–Kolkata by land</td>
<td>452</td>
<td>4323</td>
<td>4583</td>
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</tbody>
</table>

Source: ADB BIMSTEC Transport Infrastructure and Logistics Study (BTILS)

The calculations show that for a 10 ton shipment the land route was theoretically 30–40% faster than the maritime route. However, if the trade facilitation constraints in Kolkata were resolved to reduce the delays in the port from 11 days to a more normal 3 days the sea route would probably be faster than the land route. Perhaps surprisingly there was little difference in distance between the land and maritime routes due to the need to transit around Bangladesh. Savings in distance could be achieved by development of a transit corridor though Bangladesh, but this would be unlikely to make any significant changes in time and cost due to the extra border crossings and quality of the Bangladesh road infrastructure. The cost of using the landbridge is almost double that of using the maritime routing. If the load size were increased from 10 tonnes to 18 tonnes, the maximum in a TEU, the land rate would probably be approximately around triple that of the current maritime connection. While these calculations were based on 2007 costs, the situation is unlikely to have changed though in all probability the difference between the two will have increased as road transport is more subject to the adverse effect of fuel increases, especially over these longer distance movements.

It is considered connectivity between GMS and East Asia will continue to be based on maritime links, supported by the road and rail modes for national collection and distribution services either end of the sea leg. The concept of a landbridge remains just that as far as the
trade and transport community are concerned, though its strategic and even touristic benefits are clear. The volumes of air traffic will remain relatively small as this link is not a volume route and can be adequately covered using underbelly space of existing passenger carriers without the need to charter in capacity.

D. Logistics and Private Sector Investment

374. It is clear that the use of advanced logistical systems in the GMS will grow significantly in the short to medium term. This is because of the increased presence of the demand drivers – a growing middle class with more spending power, supermarket and hypermarket retailing methods, multinational production systems, moves towards manufacturing of higher value products and a more general willingness to outsource logistical services. The pace of that growth will be dictated by these demand factors and supply, in the form of service by 3PLs, would be expected to respond to meet this demand. Foreign and joint venture operators are likely to continue to dominate the market in the short term, especially the international sector, but a growing national capability should gradually emerge in the medium term.

375. The logistics sector both nationally and internationally tends to be the domain of the private sector because it requires high levels of customer service, innovation and flexibility. These characteristics are not generally available in the public sector environment. The 3PLs are usually responsible for their own hard infrastructure, such as central and regional physical distribution centers and for software, such as IT systems. The role of the public sector is largely confined to planning issues, particularly the reservation of land at key transport nodes where the logistics operators can place their warehousing. In some countries such as Viet Nam, physical distribution centers are even incorporated within Special Economic Zones in order to help integrate logistics and manufacturing. In some cases it could be argued that when developing major road infrastructure which is likely to involve creation or development of an important transport node that due regard should be given as to whether adequate allowances have been made early on in the planning process for locating the logistics supporting infrastructure as part of the overall road program.

376. In the context of trade logistics in general there are expected to be three principle types of infrastructure investment facilities required to support trade facilitation, other than the road infrastructure discussed elsewhere. These are the border crossings, inland clearance depots and ports. The following sections discuss the potential investment needs in these three areas, their priority in the context of the GMS and whether private sector investment is possible or appropriate in funding such developments.

377. In the context of trade routes and the GMS initiative based on corridors, efficient land border infrastructure represents a key aspect in facilitating the movement of intra-subregional trade and in mitigating the inherent trade disadvantages of the two landlocked countries. There are three main components to the land border facilities:

- Road border checkpoints;
- Supporting road transfer terminals; and
- Rail border checkpoints.

378. A standard road border checkpoint consists of entry and exit gates, separate processing lanes and booths for passenger and freight vehicles, processing halls for handling pedestrian traffic, administrative offices for the various border agencies and parking areas for users and
staff. All such facilities are located within a designated enclosed ‘border security zone’ with clear segregation between inbound and outbound traffic streams in order to ensure the integrity of the controls. In general, most of the GMS borders have all of these internal components, but the key issue is their configuration relative to the specific traffic flows and the processing taking place at that location.

379. Border crossings are essentially processing areas, thus they should be designed on the basis of ‘form follows function’ techniques. This concept requires mapping of the procedures in terms of ergonomics and process flow and then placing the ‘form’ (the infrastructure) over the process. This ensures the ‘form’ or border infrastructure conforms to the processing required to be undertaken within the security zone. Unfortunately, in many cases the borders have been designed predominantly on the basis of ‘form’, often with impressive buildings creating an positive national image, but with the processing ‘function’ having been subservient. The result is processing bottlenecks and delays at border crossings generated by the poor layout. While it is recognized the major causes of border delays in the GMS tend to relate to processing requirements, nonetheless it is often also compounded by poor design. It is critical that future border infrastructure complements the processing and therefore results in enhanced performance.

380. Many of the GMS borders require supporting road transfer terminals, either as an extension of the border checkpoint zone or more commonly on an adjacent site. The primary function of these facilities is to act as an interface between the national road transport systems of the two connecting countries in the absence of through-transport agreements. As indicated in Chapter III, the CBTA has had limited impact on promoting through-transport to date and there are residual vested interests or regulations which suggest positive change will be probably be gradual rather than instantaneous. Thus, the practice of transferring cargo from one vehicle to another with or without intermediate storage will continue for some time. Many of the delays at borders tend to be incurred within these terminals or in the absence of such facilities on the approach roads to the Border Control Points (BCP). While the primary delay arises from the need to undertake the cargo transfer, the performance of that transfer can be significantly affected by the capacity and layout of such terminals.

381. The first priority is to ensure that such transfers are undertaken in a designated controlled area, rather than on the roadways or adjacent vacant ground. It is accepted in the case of exports the need for a controlled environment is less important, but for imports it is critical to ensuring the integrity of the control mechanisms. Such facilities should ideally be enclosed, have a semi-permanent customs presence and have a regular labor force. In many of the GMS countries the facilities, where present, tend to be provided by the customs or local authorities.

382. In the case of both the border crossings and the supporting road transfer terminals it is difficult to attract private sector funding. The border crossings are usually security zones and are manned by various paramilitary or government authorities. This situation automatically tends to suggest public sector funding only. The situation with regard to the supporting freight terminals is similar, but also there is the issue of it being a ‘common-user’ facility. Opposition to private sector ownership of such facilities by vested interests is expected, given the potentially monopolistic environment. Theoretically the private sector could invest in such facilities, but in practice they rarely do so.

383. At this stage there are very few international rail border checkpoints or terminals, as the only connections are between PRC and Vietnam. This involves a gauge change with such
operations taking place at Dong Dang in Lang Son Province and will take place at Lao Cai or Hekou when that link is reopened. Development of rail border infrastructure tends to be less critical because standard marshalling yards can be used for border checks on freight traffic and border stations for passenger traffic. Generally, rail traffic is less time-sensitive and involves high volumes of bulk cargo which does not require time-consuming checks. Standard border checks usually take around 2 hours, but this time-span is extended significantly in the case of gauge changing to around 8 hours. At this stage there are no specific investment requirements at the few existing border roads, but as the rail network in GMS is extended the need for supporting border infrastructure will arise. This will require public sector funding through the relevant state rail authorities, rather than any private sector involvement.

384. At this stage no physical audit has been undertaken of the key border crossings and associated terminals to identify specific investment priorities. Nonetheless, there is evidence of problems at a number of important GMS corridor crossing points, being manifest in the delays in transit and queuing at certain locations. The busiest land border crossing in the GMS region is at Sadeo-Padang Besar between Thailand and Malaysia. It has been obvious for some time that the current facilities were insufficient for handling the volumes of traffic routing through the road facility. This results in severe congestion with long delays and queues on the main approach roads. The principle flow is southbound, predominantly Thai exports routing through Penang or Port Kelang ports. These problems have been recognized by the Thai Government who now proposing to fund construction of new border handling facilities to resolve these constraints.

385. At other Thai borders there appears a mismatch between the facilities on the Thai side and those in the interfacing countries. These are busy borders, especially in relation to localized passenger traffic. For example, at the Thai – Myanmar border at Mae Sot - Myawaddy there is an almost constant flow of people in both directions all day and this is replicated to a lesser extent at the Mae Sai –Tachilek border. At both locations there is a vibrant cross-border trading activity which tends to swell passenger numbers and generate large volumes of small freight vehicles flows. Thailand has adopted a logical strategy to try to separate the passenger and cross-border trade from the standard freight traffic, as proposed under the recommended by the Revised Kyoto Convention. At Mae Sae a separate freight terminal has been constructed adjacent to a freight border crossing with traffic bypassing the centre of the town.

386. A similar development is proposed at the busier Mae Sot crossing linked into the construction of a second bridge to handle the freight traffic. This is intended to connect direct to a trade zone on the Myanmar side, thus avoiding transit through the centre of Myawaddy. The current weight restriction on the existing bridge and the predominant use of multiple river crossings results in severe congestion in the centre of Myawaddy township where the cargo is reloaded for inland transit. The Thai Government is funding the new river crossing and roads from Myawaddy to the hinterland, but there is no indication of funding for a new freight border crossing or terminal on the Myanmar side for this new road alignment. Anecdotal evidence suggests that the facilities at Tachilek are also not complementary to those at Mai Sai. The dominant freight flow is from Thailand with transshipment taking place on the Myanmar side of the border. The above suggests that urgent investment may be needed in Myanmar for upgrading or construction of new border infrastructure.

387. A similar problem exists at the busy border with Cambodia at Aranyaprathet – Poipet. The border crossing infrastructure is located in the center of both towns and the dominant traffic stream is passenger traffic, mainly related to cross-border trade and the casinos in Poipet. There is a freight terminal on the Cambodia side in Poipet, but it is of limited size and difficult to
reach passing through all the passenger-related traffic and because of the positioning of certain structures. Both sides agree there is a need for a bypass to handling the freight traffic and some associated freight terminals. The latter is required due to the difference in vehicle axle loads which is likely to constrain the potential for through transport even in the event of full implementation of the CBTA. Funding is urgently needed to resolve this situation when an agreement on the new road alignment can be agreed.

388. The PRC borders are generally well provided for both in terms of border crossings and freight terminals, many of which also act as border markets. In Vietnam the ADB has been active in funding and upgrading of the most important border facilities at the Lao Cai border with PRC and the Moc Bai border with Cambodia. The status of other Vietnamese borders is unknown at this stage, as is the specific situation in both Laos PDR and Cambodia. Similarly the condition of the two Myanmar borders with PRC is unknown. It is important to note a border crossing consists to two interfacing facilities separated by the border line, but that they are mutually reliant on each other in terms of overall performance. Investment on one side can easily be compromised by lack of investment at the partner facility. Thus it is critical that border facilities are assessed in pairs, rather than solely on one side.

389. Another key area where logistics support infrastructure may be required for the development of trade facilitation is the provision of container freight stations (CFS) and inland clearance depots (ICD). The primary function of a CFS is to handle less-than-container-load cargoes. Mixed loads are deconsolidated into separate consignments for clearance and delivery purposes or in the case of exports the different mini-shipments are consolidated into a single port-to-port container-load. The CFSs were traditionally located within the port area, but are now normally located in the immediate environs of the port gate. These are usually customs-approved terminals in order that they can act as a clearance facility for small consignment traffic. In many cases this primary role has been extended to support the quayside operations by storing empty units and even handling full container loads (FCL) in order to relieve the congestion in the port terminals. These facilities are usually provided by the private sector, such as shipping lines and stevedoring companies, but are subject to planning agreement by the public sector. Sometimes the CFS may be owned by a public body such as the Port Authority, but they are generally developed as a commercial operation and therefore expected to be self-funding.

390. An inland clearance depot is a facility approved by Customs to which goods imported in containers or on vehicles or in rail wagons may be forwarded to from the national point of entry
(port or border crossing) for final customs clearance or from which goods intended for export in container or vehicles may be made available for initial export controls. It is located outside the seaport area or outside the border crossing in the case of land borders. The facility is not necessarily mode specific in that it may be a road-road clearance or road-rail intermodal transfer facility or even rail-rail.

391. An Inland Container Depot is a variant of an Inland Clearance Depot which is either dedicated to or predominantly concerned with the processing of containerized cargoes. Its primary function is still customs clearance, with cargo handling and storage as supplementary activities. These terminals are usually located close to centers of demand (large conurbations or production centers) or very occasionally adjacent to major land border crossings. Critically, this type of depot allows import containers to move quickly through the port container yards (CY) to a facility close to the end-user and to enable the importer or his agent to clear the goods at that location.

392. In most GMS countries only a relatively small proportion of inbound and outbound container traffic tends to pass through this type of ICD. There are several reasons for this. Firstly, the port often is either a major center of demand in itself or is relatively close to a major concentration of demand, thus there is less need for an ICD service as the unit can easily be delivered direct to the end-customer by road following clearance at the port – i.e. with one transport movement as against two with an ICD routing. In addition, in many GMS countries the concentrations of production and consumption tend to be along the seaboard, thus they have a relatively short distance access direct to the ports. Secondly, the shipping lines may not want full units travelling far into the hinterland when there is a significant import/export traffic imbalance, because units may be lost or the liability to return the empty units to the port becomes that of the sea carrier rather than delivery carrier, thus increasing their costs. Thirdly, unless the ICD is efficient the logistics chain using the ICD can soon become more expensive than direct delivery from the port. Fourthly, the customs authorities in some countries may only allow Full Container Load (FCL) traffic to clear inland.

393. Currently while most of the GMS ports have CFS nearby there are surprisingly few ICDs, mainly for the reasons cited above. Although many ICDs are privately funded, often by gaining customs approval to use existing transport depots, there is a potential need for developing common-user facilities at borders or ‘up-country’ centers of demand. The border warehouses in PRC essentially act as border ICDs and Thailand has terminals at the borders with Myanmar and Laos PDR similarly acting as ICDs. However, in the longer term there may be more scope for development of rail-connected ICDs which would require public funding. The poor rail network and lack of ‘block train’ capability is limiting factor. ADB has been involved in the funding of border ICDs, though not in GMS. The most obvious need for such ICD facility development appears to be at the Thai/Malaysian and the Thai/Cambodian borders as indicated above as part of the border infrastructure. Potential demand for ICDs at key inland locations such as Mandalay, Phnom Penh, Vientiane and even Chiang Mae may be compromised by the traffic imbalances, but export growth at these locations may make them more attractive for investment in major facilities, possibly on a PPP basis.

394. The third area where there may be investment priorities to facilitate trade facilitation is in port development. As indicated in Chapter III. D, there is sometimes a perception that the private sector is the primary source for port development and that as a result public sector funding needs are minimal. While it would be expected that bulk terminal developments would be funded by the private sector, in relation to general cargo and containers there is likely to be
demand for public funding of channel, breakwater and quay infrastructure with the private sector funding the operating superstructure.

395. No specific audit has been made of the port sector, but it is already apparent that Myanmar will probably require significant investment in its port sector, especially around Yangon as sanctions are lifted and traffic flows expend rapidly compared to their existing constrained levels. While much discussion has taken place on development of deep water ports, there has been less emphasis on general cargo requirements where the water depth is less of an issue. For container traffic Myanmar is linked into the feeder circuit serving Bangladesh and Kolkata/Haldia to the major ‘hub’ ports for the foreseeable future as it will not generate sufficient traffic for direct calls by large container vessels. The expectation is growth will be covered by increasing the frequency of calls, possibly with slightly larger feeder vessels able to operate with reduced drafts. The developments at Thilawa to a certain extent reflect that strategy, but are probably insufficient to cope with a surge in demand. A needs assessment of the port sector regarding container and general cargo facilities is recommended.

396. In the other GMS countries port development appears to be more advanced and the funding requirements clearer. In Thailand there are on-going plans to further expand Laem Chabang, irrespective of proposals to limit Bangkok port to 1 million TEU and for oil and chemical terminals at Sri Racha and Mat Ta Phut. There are outstanding issues as to how to develop the port sector in the south, especially in relation to Songkhla port and the need for a west coast port. These developments will probably involve PPP-type investments. In Vietnam major investments are already taking place in the south around Ho Chi Minh – Vung Tau and corresponding investment may be required in the north around Hai Phong if it is to attract PRC traffic. Indications are that private sector investment may be more difficult to attract in the north due to the draft constraints. In PRC investment in port facilities along the southern seaboard have been significant in recent years. Indeed, there are suggestions of over-investment such that there is probably limited need for further investment in the short term. The situation in Cambodia is not clear from recent reports. Clearly, further development of Sihanoukville port will depend to some extent on improvements in road connectivity, but it is expected to face increasing competition from Saigon Port. This situation suggests that attracting private sector investment may be difficult to attract, especially in relation to container development.

397. In summary the identified priority investments in the trade logistics sector to complement trade facilitation are as follows:

- Provision of border check points and a transfer terminal at Poipet linked to development of a bypass;
- Development of border check points and freight terminals on the Myanmar side of the main Thai-Myanmar borders; and
- Possible development of port facilities around the Yangon area.

398. It is unlikely private sector funding would be available for these developments, though in the case of port development concession or PPP arrangements could provide some private funding especially of superstructure. The development of internal logistics facilities such as central and regional warehouses, including bulk import and export terminals, should be provided and funded almost exclusively by the private sector.
VIII. POTENTIAL PRIORITY TRADE INVESTMENT PROJECTS

A. Bottleneck and Gaps in Primary Trade Routes

The review of the infrastructure assessment and the key trade routes identified in the previous chapter suggests there are six locations/areas where there are infrastructure bottlenecks and gaps that potentially adversely affect trade facilitation. The list assumes all road projects currently under construction/rehabilitation are completed. They are summarized in Table 8.1.

Table 8.1: Bottlenecks and Gaps along Primary Trade Routes

<table>
<thead>
<tr>
<th>Identified Primary Trade Routes</th>
<th>Bottlenecks and Gaps along Primary Trade Routes</th>
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</thead>
<tbody>
<tr>
<td>Trade Route 1:</td>
<td>• Bottleneck on the southern extension of the NSC between Hat Yai and Sadao near the Malaysian border and possibly at the border itself</td>
</tr>
<tr>
<td>NSC via Lao PRD (AH2/AH3), especially close towards the southern end near Bangkok/Laem Chabang and in the south near the Malaysian border</td>
<td></td>
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<tr>
<td>Trade Route 2:</td>
<td>• Bottleneck at the Aranyaprathet – Poipet Border Crossing along SC; and</td>
</tr>
<tr>
<td>SC between Bangkok and Ho Chi Minh City via AH1, especially on the Thai and Vietnamese sections</td>
<td>• Bottleneck at Phnom Penh at the intersection of the SC and CC</td>
</tr>
<tr>
<td>Trade Route 3:</td>
<td>• Bottleneck along congested Highways 3 and 7 near Laem Chabang port; and</td>
</tr>
<tr>
<td>Thailand section of the CC between Bangkok/Laem Chabang and Vientiane via AH2</td>
<td>• Potential bottleneck at Luang Prabang where the CC, the NEC and the Mekong River all converge.</td>
</tr>
<tr>
<td>Trade Route 4:</td>
<td>[None initially identified]</td>
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<tr>
<td>Yangon-Mandalay route (AH1), incorporating the Payagi - Meiktila section of the WC</td>
<td></td>
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<tr>
<td>Trade Route 5:</td>
<td>• Gap along EWC/WC requiring the upgrading of the Kawkareik to Thaton Road and possibly as far as Payagyi; and</td>
</tr>
<tr>
<td>Bangkok and Payagi via Mae Sot – Myawaddy using a combination of the NSC and the WC</td>
<td>• Bottleneck at the Mae Sot – Myawaddy Border Crossing</td>
</tr>
<tr>
<td>Trade Route 6:</td>
<td>[None initially identified]</td>
</tr>
<tr>
<td>NC between Kunming and Nanning</td>
<td></td>
</tr>
<tr>
<td>Trade Route 7:</td>
<td>[None initially identified]</td>
</tr>
<tr>
<td>EC between Kunming and Hai Phong via AH14</td>
<td></td>
</tr>
<tr>
<td>Trade Route 8:</td>
<td>• Bottleneck at Phnom Penh at the intersection of the SC and CC (also in Trade Route 2).</td>
</tr>
<tr>
<td>CC between Phnom Penh and Sihanoukville via AH11.</td>
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</tr>
</tbody>
</table>

Two of the bottlenecks will not be considered as potential investment projects: (i) congestion along Highways 3 and 7 near and leading to the Laem Chabang port, as the Thai DOH has indicated that it will continue to fund/implement the upgrading of highway access to the port of Laem Chabang; and (ii) the potential bottleneck at Luang Prabang where the CC, the NEC and the Mekong River all converge, since some of the shorter bypasses have already
been constructed and another planned in the future, plus there is no readily apparent need for ADB assistance.

B. Potential Investment Projects

401. The following four potential investment projects in the road and trade logistics subsectors have been identified based on their potential assistance in enhancing trade facilitation. They are presented in the relative order of highest to lowest priority for possible ADB participation. All four will be included in the TOR for the follow-on Study.

1. Upgrading of the Kawkareik – Thaton Road Project (AH1 in Myanmar)

402. As indicated in the infrastructure assessment the logical next section for improvement along the EWC/WC in Myanmar is the upgrading of the Kawkareik to Thaton road section (following the AH1 corridor), a distance of about 134 km (see Figure 8.1). The project should initially be implemented in two phases: (i) Kawkareik to Eindu; and (ii) Eindu to Thaton, with Eindu being the match line between the East-West Corridor and the Western Corridor. The major items of upgrading would include: (i) road and shoulder widening and the strengthening of the structural pavement section, including a new pavement course; new cross and side drainage; and the improvement of highway furniture. There would also need to be upgrading and additional widening of the roadway through the urbanized areas of Kawkareik and Hpa-an. The project would necessarily also include upgrading/widening of at least two bridge structures: the major Thanlwin Bridge (Hpa-an) about 685 m in length and the Hlaingbwe Chaung River Bridge of unknown length, but estimated herein at about 50 m in length. Clearly the upgrading of the Thanlwin Bridge (Hpa-an) could easily end up being a subproject of the overall project and a likely candidate for co-financing by either Japan or Korea.

403. A potential third phase of the project would be to improve the connection to the Port of Mawlamyine, but present indications are that implementation of such a third phase is not a present priority in terms of trade facilitation. Nevertheless the TOR for the PPTA consultant for the Kawkareik to Thaton Road should include a component to study the need for and location of, an upgraded road connection to Mawlamyine. The study would look at three possible routes: (i) direct connection from Eindu or Hpa-an; (ii) from the south connecting to Highway 8 from Thanbyuzayat; or (iii) by improving Highway 8 south from Thaton. The budget cost estimate to upgrade the 134 km road section between Kawkareik and Thaton would be in the range of $60-75 million, not including any major reconstruction (except for minor widening and repair) of the Thanlwin Bridge (Hpa-an). This project is considered the highest priority investment based on the initial assessments undertaken in this study.

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59 It is recognized that there is a need to gradually upgrade the route all the way to Payagyi where it meets the main north–south route between Yangon and Mandalay (Trade Route 4). Given the high cost of rehabilitating this route, only the most difficult easterly section that represents the primary trade facilitation constraint has been included at this stage.

60 The condition of both bridges is unknown but based on discussions with DOH officials it can be assumed that both bridges are in need of major repairs/widening/upgrading.
2. Bypass Road and Infrastructure Improvements, Aranyaprathet – Poipet Border Crossing Project

A project to upgrade the Aranyaprathet – Poipet border crossing has been the focus of discussion for a number of years. As was pointed out in the assessment, it is considered that the time may be right for the Governments of Thailand and Cambodia, assisted by technical assistance and the expertise of the ADB, to finally agree to a solution for improving this border crossing. Based on past knowledge and previous site visits to the Aranyaprathet/Poipet area, it is considered that the only logical solution will be a bypass road avoiding the present congested area. In effect, this would probably mean separating the freight flow from the passenger traffic, most of which is destined for Poipet itself. This would be similar to the strategy adopted at other Thai land borders of traffic separation. Both a Northern Bypass and a Southern Bypass have been discussed in the past by the two countries. A site visit was made to the border crossing about 2 years ago and reportedly little changed since that visit. The following paragraphs on the Northern and Southern Bypasses contain information obtained during a site visit conducted by TRM about 2 years ago.

The Northern Bypass on the Cambodian side is 10 km long, beginning at about km 133+100 along the Poipet - Sisophon Highway (Route 5), at a point about 13 km east of the existing border crossing. This new road has been partially constructed within a cleared right-of-way of about 40-50m. It was constructed a few years ago up to sub-base level, but final cross
drainage and side drainage were still lacking, as was base course and pavement surfacing. The horizontal and vertical alignments were both very good and should easily support a design speed of 80-100 km per hour. Construction apparently had been stopped and the partially completed road had then been abandoned; and completed works were not being maintained. The road was originally developed under a BOT by a private developer to serve a large industrial estate. The Northern Bypass alignment on the Thai side of the border would be about 12 km in length and would pass north of Route 3374 and intersect Route 348 at the existing T intersection with the already constructed Route 348 Bypass north of Aranyaprathet. The proposed horizontal alignment of the new 12 km of roadway was good and would have two long tangent sections and pass through relatively sparsely developed areas.

406. Resettlement and purchase of rights-of-way would be issues, but would be significantly less severe than those which would be encountered if the Southern Bypass was implemented. Vertical gradients would be relatively flat and unit roadway construction costs per kilometer would be relatively low. The exact demarcation of the border at this northern crossing location had yet to be agreed between the Governments of Thailand and Cambodia. Maps of the area indicate there is a meandering stream along the previously assumed border at this location. It was reported that many land mines exist in this area. There are no readily apparent significant physical or engineering drawbacks to the overall 22.5 km alignment of the Northern Bypass. It is felt that even if the exact location of the demarcation line remains an issue, the problem could easily be solved by fencing in the ‘no man’s land’ along the entire section of road in doubt, with future border facilities being constructed outside of the disputed area.

407. The Southern Bypass on the Cambodian side of the border is located off of and to the south, of the Poipet - Sisophon Highway (Route 5) along the SC, approximately 7 km east of the existing border crossing. It consisted of a 2 km earth road dead ending at a well-defined 30 m wide stream, which is reportedly accepted by both governments as the demarcation line of the border. The road also crosses the existing Royal Cambodian Railway right of way. The horizontal alignment of this road is relatively straight and with only limited development along the alignment. The vertical alignment is relatively flat throughout and there is essentially no existing traffic along the alignment. From an engineering standpoint it would offer relatively few problems to construct cross border facilities (CBF) along this Cambodian section of road, although some resettlement issues might be encountered. However, on the Thailand side of the border the construction of a Southern Bypass would present a number of very difficult issues. Shortly after crossing the stream and entering Thailand the new road would intersect Route 3366 running in an east-west direction, which is a narrow road with sporadic development along
both sides. Approximately 9 km to the west, the road passes through a very urbanized section of Aranyaprathet, located just to the south and parallel to Route 33 on the SC.

408. The follow-on TA Consultant will need to meet with transport officials of both countries and town planning officials from both Aranyaprathet and Poipet, to determine the current status of discussions, if any, concerning bypasses and upgrading of the border crossing. The Consultant would then have to carry out detailed site reconnaissance of possible bypasses (and/or along any other suggested bypass that may have been discussed recently). The Consultant would then prepare a conceptual layout design for bypasses and the proposed upgraded border crossing, including a budget cost estimate for the implementation based on the conceptual layout design. It is envisioned that if, as a result of the follow-on TA, this project moves forward, that a PPTA consultant would undertake a detailed feasibility study and then prepare a final design of the bypasses and the new border crossing and associated facilities. Eventual financing for work on the Cambodian side could be financed with assistance from the ADB and possibly also from Thailand, while the improvements on the Thai side would be financed by Thailand. This project is considered as the second highest priority investment based on the initial assessments undertaken in this study.

3. Development of the Myanmar – Thailand Border Infrastructure Project

409. The current arrangements at the border crossings between Myanmar and Thailand reflect the restrictions on international trade arising from sanctions and difficult economic conditions, as well as constraints in overall road connectivity. These problems have been exacerbated at the main border Myawaddy – Mae Sot on the East – West Corridor by damage to the main bridge and the diversion of freight traffic to small riverside quays. In reality, the current crossing is a cross-border trade/passenger crossing with most freight being diverted to these river ports and then being reloaded in the center of town for clearance and onward transit inland. This approach is not considered to be sustainable when unrestricted trade is permitted.

410. The Thai Government is proposing construction of a second bridge over the Theungyin River to the north of the current crossing. In effect, it is intended that there will be a freight bypass avoiding both town centers and this will link into a special trade zone on the Myanmar side. It is understood funding of the bypass and second Friendship Bridge has been agreed based on Thai Government funding. However, current indications suggest this has not included the provision of a border checkpoint and freight transfer terminal on the Myanmar side. It is unlikely that CBTA arrangements will permit through transport in the near future and therefore the need to transfer loads on one side or the other will continue. In addition, redevelopment of the road between Myawaddy and Payagyi suggested above will mean severe interruptions in traffic flows which will further promote cargo transfers with possible intermediate storage.

411. A similar situation exists on the North-South Corridor at the Tachilek- Mae Sai border, but Thailand has already invested in a bypass and freight terminal on the eastern side of the town. Indications are that corresponding facilities have not been developed on the Myanmar side of the border. Transporters are suggesting that road traffic between Thailand and PRC is being diverted through Laos PDR, in part due to the poor arrangements and facilities on the Myanmar side.

61 There has been some recent discussion that if both countries cannot agree on location of a bypass then the only recourse would be to make another attempt to improve the border crossing at the current location; which would not be a preferred solution to this bottleneck.
412. It is proposed that the follow-on TA Consultant initially further clarifies the funding proposals by the Thai Government in relation to the new bridge and northern bypass at Mae Sot, together with any funding being offered for border developments on the Myanmar side. In addition discussions will be required with the relevant authorities on the Myanmar side as to the phasing out of the river port arrangements and what facilities will then be required in the longer term to handle the large volumes of bilateral trade. The Consultant would then prepare a conceptual layout design for the proposed upgraded border crossing and freight transfer terminal, including a budget cost estimate for implementation based on the conceptual layout design. If this project were approved for further assessment it is suggested that a parallel needs-assessment be undertaken at Tachilek. The budget cost for such facilities at each location would be approximately $5-10 million per border depending on their complexity.

413. It is envisioned that if, as a result of the follow-on TA, this project moves forward, then a PPTA consultant would undertake a detailed feasibility study at each location and would prepare a final design of the new border crossing and associated facilities on the Myanmar side. Eventual financing for work on the Myanmar side could be financed with assistance from the ADB and possibly also from Thailand. This project is considered as the third highest priority investment based on the initial assessments undertaken in this study.

4. Phnom Penh Bypass Project

414. A major land transport bottleneck along the SC and the intersecting CC is the urbanized area of Phnom Penh. Solving the present traffic congestion and lack of connectivity between the major corridors is compounded by the existence of three major rivers: Tonle Sap, Bassac and Mekong Rivers. Since 2007 JICA has been attempting, on and off, to move forward with a comprehensive ring road master plan study for Phnom Penh. To date, little actual progress has been made in implementing much needed bypasses of the city (i.e. a part of a future ring road) so that traffic along the SC, Highway 1 and along the CC Highways 6, 7 and 4 and Highway 3 connecting to the SCC could be interconnected with a controlled access bypass expressway. It is clear that any such bypass/ring road will necessarily encounter environmental and resettlement issues, but the earlier these issues are addressed, the less serious, in the long term, will be the environmental and social problems.

415. The ADB role is envisioned to initially provide a PPTA (i) to review the existing alignment for the Phnom Penh Ring Road that is being proposed by the Phnom Penh city government; (ii)
then prepare a detailed feasibility study on a particular segment (or segments) of the future Ring Road which will provide the highest initial economic rates and most efficient diversion of traffic around the city; and (iii) provide financial assistance for the construction of these initial ring road segments. Depending on the policy of the city government, it can be expected that the PPTA will also consider alternate public sector financing of this project through an appropriate PPP.

5. Yangon Port and Road Access Assessment

416. Yangon Port is located on the central coastline on the banks of the Yangon River 40 km upriver from the Gulf of Martaban off the Andaman Sea. Administered by the Myanmar Port Authority (MPA) it is Myanmar's premier port handling approximately 90% of the country's foreign trade. The port consists of a series of PRA operated wharves – the Hteedan Rice Berth, the Sule Pagoda Wharves, the Port Health Jetty and the Bo Aung Gyaw Wharves. In addition there are other wharves, such as the Ahlone Wharves, Myanmar Industrial Port Wharves and Thaketa Wharves operated by other companies. These facilities are located predominantly along the city's waterfront and therefore much of the trade traffic passes through the city center.

417. The main container operations are located at the Myanmar International Terminal Thilawa (MITT) managed by Hutchison Ports. This facility is located at Thilawa on the east side of the river towards the river mouth, adjacent to the Thanlyin-Kyauktan Special Economic Zone. Larger vessels with deeper drafts can dock here due to its proximity to the river mouth. This facility has both road and rail connectivity. In addition, there are two supporting Inland Container Depots at Botataung in the south part of the city.

418. A key concern is the likely impact of the removal of international sanctions in placing an immediate strain on the port infrastructure and the various access points. The market penetration of containerization in general cargo imports and exports, in particular, is significantly lower than in other GMS countries. The expected high growth, especially in container traffic, could result in congestion within the various terminals and in the immediate environs of metropolitan Yangon, as well as along the river bank and across the Thanliyin Road-Rail Bridge and the more easterly road bridge connection, both of which connect to Thilawa.

419. It is proposed that an assessment be made of the development needs of the Yangon Port complex, especially the need for container capacity expansion and supporting Container Freight Stations and Inland Container Depots, combined with an assessment of the road
network connecting these various port facilities with both the city's main industrial centers and the Asian Highway 1, which acts as the main road corridor to the port's hinterland. The objective is to identify potential investment needs, both in terms of road and port infrastructure, required to handle the substantial traffic increase in the short to medium term, assuming unrestricted trading is permitted.
References


Appendix 1: International traffic data used in modeling GMS trade in ADB TA 7557: Promoting Regional Infrastructure Development project

<table>
<thead>
<tr>
<th>ADB Corridor No.</th>
<th>AH TAR No.</th>
<th>Origin</th>
<th>Destination</th>
<th>Border Crossing/Port</th>
<th>Traffic Volume</th>
<th>Issues</th>
<th>Delays</th>
<th>ADB Project</th>
<th>Initial priority to trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>North/ South Corridor</td>
<td>AH3</td>
<td>Kunming (PRC)</td>
<td>Bangkok (Thailand)</td>
<td>Mohan (road crossing) (PRC)</td>
<td>75 trucks per day</td>
<td>Transshipment</td>
<td>10 hours</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>AH3</td>
<td></td>
<td>Boten (road crossing) (Lao PDR)</td>
<td></td>
<td></td>
<td>75 trucks per day</td>
<td>n/a</td>
<td>2 hours</td>
<td>AH database 38052 REG</td>
<td>M</td>
</tr>
<tr>
<td>AH3</td>
<td></td>
<td>Houayxay (road crossing) (Lao PDR)</td>
<td></td>
<td></td>
<td>30 trucks per day but not crossing</td>
<td>Bridge under construction Lao transport can enter Thailand but problem return loads due imbalance in trade</td>
<td>2 hours</td>
<td>H</td>
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<tr>
<td>AH3</td>
<td></td>
<td>Chiang Khong (road crossing) (Thailand)</td>
<td></td>
<td></td>
<td>410 trucks per day</td>
<td>Bridge under construction Thai trucks can enter Lao PDR</td>
<td>1 hours</td>
<td>AH database 38052 REG</td>
<td>H</td>
</tr>
<tr>
<td>AH2</td>
<td></td>
<td>Daluo (road crossing) (PRC)</td>
<td></td>
<td>n/a</td>
<td>Transshipment</td>
<td>12 hours</td>
<td>M</td>
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<td>AH3</td>
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<td>Menkla (road crossing) (Myanmar)</td>
<td></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>M</td>
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<td>AH2</td>
<td></td>
<td>Tachilek (road crossing) (Myanmar)</td>
<td></td>
<td>n/a</td>
<td>Thai trucks unload for transshipment</td>
<td>2 hours</td>
<td>BITLS</td>
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<tr>
<td>AH2</td>
<td></td>
<td>Mai Sai (road crossing) (Thailand)</td>
<td></td>
<td>1400 trucks per day</td>
<td>New border complex for processing and transshipment</td>
<td>3-4 hours</td>
<td>AH database 38052 REG</td>
<td>H</td>
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<td>AH2</td>
<td></td>
<td>Bangkok (port) (Thailand)</td>
<td></td>
<td>1,400,000 TEU</td>
<td>Restricted draft and Government want to reduce throughput to 1 million TEU as in city center</td>
<td>1-2 days maximum</td>
<td>M</td>
<td></td>
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<tr>
<td>Eastern Corridor (NE spur)</td>
<td>AH14</td>
<td>Kunming (PRC)</td>
<td>Hai Phong (Vietnam)</td>
<td>Hekou (road crossing) (PRC)</td>
<td>n/a</td>
<td>Transshipment</td>
<td>10 hours</td>
<td>M</td>
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<tr>
<td>AH14</td>
<td></td>
<td>Lao Cai</td>
<td>183 trucks</td>
<td>n/a</td>
<td>5 hours</td>
<td>AH</td>
<td>M</td>
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<td>Road Corridor</td>
<td>AH14</td>
<td>Nanning (PRC)</td>
<td>Ca Mau (Vietnam)</td>
<td>Hai Phong (port) (Vietnam)</td>
<td>14.3 million tonnes including 815,000 TEU in 2009</td>
<td>Feeder ship only due limited draft Feasibility study being undertaken on development of Lach Huyen deep-water port</td>
<td>n/a</td>
<td>H</td>
<td></td>
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<tr>
<td>x</td>
<td>Ah1</td>
<td>Donggang (road border) (Vietnam)</td>
<td>Youyiguang (road border) (PRC)</td>
<td>480 trucks per day</td>
<td>Transshipment Facility gets congested</td>
<td>7 hours</td>
<td>41414 – VIE</td>
<td>M</td>
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<td>x</td>
<td>Ah1</td>
<td>Dongxing (road border) (PRC)</td>
<td>N/a</td>
<td>Transshipment</td>
<td>n/a</td>
<td>n/a</td>
<td>41414 – VIE</td>
<td>M</td>
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<td>x</td>
<td>Ah1</td>
<td>Mong Cai (road border) (Vietnam)</td>
<td>?500 trucks per day</td>
<td>n/a</td>
<td>n/a</td>
<td>41414 – VIE</td>
<td>M</td>
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<tr>
<td>Ah1</td>
<td>Ah1</td>
<td>Da Nang (seaport) (Vietnam)</td>
<td>3.13 million tonnes including 70,000 TEU in 2009</td>
<td>Feeder only operations as demand small</td>
<td>n/a</td>
<td>-</td>
<td>M</td>
<td></td>
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<tr>
<td>Ah1</td>
<td>Ah1</td>
<td>HCMC (seaport) (Vietnam)</td>
<td>14 million tonnes including 378,000 TEU in old port and 2.46 million TEU in new port</td>
<td>Developing into major container port with mainline calls. New container terminals opened in 2009 at Saigon New Port</td>
<td>n/a</td>
<td>-</td>
<td>H</td>
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<tr>
<td>East-West Corridor</td>
<td>Ah1</td>
<td>Mawlamyine (Myanmar)</td>
<td>Da Nang (Vietnam)</td>
<td>Myawadi (road border) Myanmar)</td>
<td>50 trucks per day</td>
<td>Thai trucks unload for transshipment. Road very bad on this side</td>
<td>M</td>
<td></td>
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<tr>
<td>Ah1</td>
<td>Ah1</td>
<td>Mae Sot (road border) (Thailand)</td>
<td>50 trucks per day</td>
<td>Processing required parking in main street Fully automated</td>
<td>1 hour</td>
<td>M</td>
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<tr>
<td>Ah16</td>
<td>Ah16</td>
<td>Mukdahan (road border)</td>
<td>389 trucks per day</td>
<td>New 2nd Mekong Bridge Thai trucks can</td>
<td>2 hours</td>
<td>AH database</td>
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<td>Country</td>
<td>Corridor</td>
<td>AH</td>
<td>Origin</td>
<td>Destination</td>
<td>Mode</td>
<td>Volume</td>
<td>Description</td>
<td>Time</td>
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<td>(Thailand)</td>
<td></td>
<td>AH16</td>
<td>Savannakhet (road border) (Lao PDR)</td>
<td>220,000 tonnes imports</td>
<td>New 2nd Mekong Bridge Loa transport can enter Thailand but problem return loads due imbalance in trade. Most goods transshipped</td>
<td>3 hours</td>
<td>H</td>
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<td>Lao PDR</td>
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<td>AH16</td>
<td>Dansavanh (road border) (Lao PDR)</td>
<td>80 trucks per day</td>
<td></td>
<td>6 hours</td>
<td>AH database 38052 REG</td>
<td>M</td>
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<tr>
<td>(Vietnam)</td>
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<td>AH16</td>
<td>Lao Bao (road border) (Vietnam)</td>
<td>64 trucks per day</td>
<td>Modern facilities built in 2006</td>
<td>6 hours</td>
<td>AH database 38052 REG</td>
<td>M</td>
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<tr>
<td>(Vietnam)</td>
<td></td>
<td>AH1</td>
<td>Da Nang (seaport) (Vietnam)</td>
<td>3.13 million tonnes including 70,000 TEU in 2009</td>
<td>Feeder only operations as demand small</td>
<td>n/a</td>
<td>-</td>
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<td>Western Corridor</td>
<td>AH1</td>
<td>Tamu (Myanmar)</td>
<td>Mawlamyine (Myanmar)</td>
<td>Tamu (road border) (Myanmar)</td>
<td>60 trucks from India per day</td>
<td>Low volumes due civil unrest and poor accessibility Poor access. Proposing a new road route as often closed</td>
<td>AH database 38052 REG BIMSTE C</td>
<td>M</td>
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<tr>
<td>Tamu (road border) (Myanmar)</td>
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<td>Northern Corridor</td>
<td>Tamu (road border) (Myanmar)</td>
<td>AH1</td>
<td>Fangcheng (PRC)</td>
<td>60 trucks from India per day</td>
<td>Unrest and poor accessibility Poor access. Proposing a new road route as often closed</td>
<td>AH database 38052 REG</td>
<td>M</td>
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<tr>
<td>PRC</td>
<td></td>
<td>AH14</td>
<td>Muse (road border) (Myanmar)</td>
<td>100 trucks per day</td>
<td>Main route into PRC</td>
<td></td>
<td>AH database 38052 REG</td>
<td>M</td>
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<tr>
<td>Ruili (road border) (PRC)</td>
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<td>AH14</td>
<td></td>
<td>100 trucks per day</td>
<td>Main route from Myanmar to PRC</td>
<td></td>
<td></td>
<td>M</td>
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<tr>
<td>(Thailand)</td>
<td></td>
<td>North-Eastern Corridor</td>
<td>Sattahip (Thailand)</td>
<td>Thanh Hoa (Vietnam)</td>
<td>4,618,000 TEU (2008)</td>
<td>Major new container port still undergoing expansion. All major private operators present Dual tracking</td>
<td>1-2 days maximum</td>
<td>H</td>
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<tr>
<td>Code</td>
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<tr>
<td>AH1</td>
<td>Bangkok (seaport) (Thailand)</td>
<td>1,400,000 TEU</td>
<td>Restricted draft and Government want to reduce throughput to 1 million TEU as in city center</td>
<td>1-2 days maximum</td>
<td>M</td>
<td></td>
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<tr>
<td></td>
<td>Xxx (road border) (Thailand)</td>
<td>0</td>
<td>No designated road border</td>
<td>-</td>
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<td>xxx (road border) (Lao PDR)</td>
<td>0</td>
<td>No designated road border</td>
<td>-</td>
<td>L</td>
<td></td>
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<tr>
<td>?AH15</td>
<td>Na Meo (road border) (Lao PDR)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>L</td>
<td></td>
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<td>Ban Sop Huo (road border) (Vietnam)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>L</td>
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<tr>
<td>Central Corridor (East)</td>
<td>A3</td>
<td>Boten (Lao PDR)</td>
<td>Sihanoukville (Cambodia)</td>
<td>Boten (road crossing) (Lao PDR)</td>
<td>75 trucks per day</td>
<td>n/a</td>
<td>n/a</td>
<td>AH database 38052 REG</td>
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<td>AH11</td>
<td>Voeung Kham (road border) (Lao PDR)</td>
<td>95 trucks per day</td>
<td>n/a</td>
<td>n/a</td>
<td>AH database 38052 REG</td>
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<td>AH11</td>
<td>Dom Kralor (road border) (Cambodia)</td>
<td>23 trucks per day</td>
<td>Possible border dry port</td>
<td>n/a</td>
<td>AH database 38052 REG</td>
<td>M</td>
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<td>AH11</td>
<td>Sihanouvill e (seaport) (Cambodia)</td>
<td>220,000 TEU (2009) peaked at 300,000 TEU in 2008</td>
<td>n/a</td>
<td>n/a</td>
<td>H</td>
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<td>Central Corridor (West)</td>
<td>AH3</td>
<td>Boten (Lao PDR)</td>
<td>Sattahip Thailand</td>
<td>Boten (road crossing) (Lao PDR)</td>
<td>75 trucks per day</td>
<td>n/a</td>
<td>n/a</td>
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<td>AH12</td>
<td>Vientiane Friendship Bridge (road border) (Lao PDR)</td>
<td>1975 trucks per day</td>
<td>Thai trucks can access ASYCUDA present</td>
<td>n/a</td>
<td>AH database 38052 REG</td>
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<tr>
<td>Corridor</td>
<td>From</td>
<td>To</td>
<td>Type</td>
<td>Landmark</td>
<td>Quantity</td>
<td>Access/Trade Note</td>
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<tr>
<td>Southern Corridor (north)</td>
<td>Nong Khai (road border) (Thailand)</td>
<td>Myvitta (road border) (Myanmar)</td>
<td>Minimal</td>
<td>141 trucks</td>
<td>Loa transport can enter Thailand but problem return loads due imbalance in trade</td>
<td>n/a</td>
<td>H</td>
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<td>AH1</td>
<td>Dai Bong Ti (road border) (Thailand)</td>
<td>Minimal</td>
<td>Poor roads limiting accessibility</td>
<td>n/a</td>
<td>L</td>
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<tr>
<td>AH1</td>
<td>Bangkok (seaport) (Thailand)</td>
<td>1,400,000 TEU</td>
<td>Restricted draft and Government want to reduce throughput to 1 million TEU as in city center</td>
<td>1-2 days maximum</td>
<td>M</td>
<td></td>
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<td>AH1</td>
<td>Aranyaprathet (road border) (Thailand)</td>
<td>755 trucks per day</td>
<td>n/a</td>
<td>Delays</td>
<td>AH database 38052 REG</td>
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<td>AH1</td>
<td>Poipet (road border) (Cambodia)</td>
<td>175 trucks per day</td>
<td>Possible border dry port</td>
<td>Delays</td>
<td>AH database 38052 REG</td>
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<td>Southern Corridor (south)</td>
<td>O Yadaw (road border) (Cambodia)</td>
<td>low</td>
<td>Newly opened border? limited infrastructure</td>
<td>n/a</td>
<td>L</td>
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<tr>
<td>AH1</td>
<td>Le Tanh (road border) (Vietnam)</td>
<td>low</td>
<td>Newly opened border No visas can be issued More substantial infrastructure</td>
<td>n/a</td>
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<td>AH1</td>
<td>Dawei (Myanmar)</td>
<td>Vung Tau (Vietnam)</td>
<td>Myitta (road border) (Myanmar)</td>
<td>Minimal</td>
<td>Poor roads limiting accessibility</td>
<td>n/a</td>
<td>L</td>
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<tr>
<td>AH1</td>
<td>Sangkhlaburi (road border) (Thailand)</td>
<td>Minimal</td>
<td>Poor roads especially on Myanmar side limits traffic</td>
<td>n/a</td>
<td>L</td>
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<tr>
<td>AH1</td>
<td>Bangkok (seaport) (Thailand)</td>
<td>1,400,000 TEU</td>
<td>Restricted draft and Government want to reduce throughput to 1 million TEU as in city center</td>
<td>1-2 days maximum</td>
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<tr>
<td>AH1</td>
<td>Aranyaprathet</td>
<td>755 trucks per day</td>
<td>n/a</td>
<td>Delays</td>
<td>AH database</td>
<td>H</td>
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<tr>
<td>Location</td>
<td>Description</td>
<td>Traffic</td>
<td>Notes</td>
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<tr>
<td>Poipet (road border) (Cambodia)</td>
<td>175 trucks per day</td>
<td>Possible border dry port</td>
<td>Delays</td>
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<tr>
<td>Bavet (road border) (Cambodia)</td>
<td>Busy</td>
<td>2nd busiest border excluding port</td>
<td>Priority for possible dry port</td>
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<tr>
<td>Moc Bai (road border) (Vietnam)</td>
<td>busy</td>
<td>Busy</td>
<td>n/a</td>
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<tr>
<td>HCMC (seaport) (Vietnam)</td>
<td>14 million tonnes including 378,000 TEU in old port and 2.46 million TEU in new port</td>
<td>Developing into major container port with mainline calls. New container terminals opened in 2009 at Saigon New Port</td>
<td>n/a</td>
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<tr>
<td>Vung Tau (seaport) (Vietnam)</td>
<td>855,000 tonnes</td>
<td>Mainly an oil port. No containers</td>
<td>n/a</td>
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<tr>
<td>Bangkok (seaport) (Thailand)</td>
<td>1,400,000 TEU (2008)</td>
<td>Restricted draft and Government want to reduce throughput to 1 million TEU as in city center</td>
<td>1-2 days maximum</td>
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<tr>
<td>Laem Chabang (seaport) (Thailand)</td>
<td>4,618,000 TEU (2008)</td>
<td>Major new container port still undergoing expansion. All major private operators present. Dual tracking of rail link to Lad Krabang ICD will raise</td>
<td>1-2 days maximum</td>
<td></td>
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<td>Handling capacity there to 1 million TEU</td>
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<td>x</td>
<td>Hat Lek (road border) (Thailand)</td>
<td>busy</td>
<td>Connection to Sihanoukville Appears more a border check point with no significant facilities</td>
<td>n/a</td>
<td>Google</td>
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<tr>
<td>x</td>
<td>Koh Kong (road border) (Cambodia)</td>
<td>busy</td>
<td>Connection from Sihanoukville check point with no significant facilities</td>
<td>n/a</td>
<td>Google</td>
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<td>x</td>
<td>Prek Chak (road border) (Cambodia)</td>
<td>low</td>
<td>No facilities Approach for ADB funding</td>
<td>n/a</td>
<td>36353 REG-RRP</td>
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<td>x</td>
<td>Xa Xia (road border) (Vietnam)</td>
<td>low</td>
<td>Modern border post but requires extension</td>
<td>n/a</td>
<td>36353 REG-RRP</td>
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