

Chapter 3

Current Status of ASEAN Transport Sector

ERIA Study Team

October 2010

This chapter should be cited as

ERIA Study Team (2010), ‘Current Status of ASEAN Transport Sector’ in *ASEAN Strategic Transport Plan 2011-2015*, Jakarta: ASEAN Secretariat and ERIA, pp.3-1—3-95.

CHAPTER 3 CURRENT STATUS OF ASEAN TRANSPORT SECTOR

3.1 INTRODUCTION

This chapter reviews the current status and performance of the transport sectors i.e. road rail, inland waterways, air and maritime transport in ASEAN Member States (AMSSs). In addition, the chapter also discusses the current status of the soft component i.e. transport facilitation that is vital for improving the performance, efficiency and effectiveness of the other three major transport sectors especially at intra-ASEAN level. The chapter discusses and compares the current scenario among the AMSSs and highlights the major issues that need an attention to improve the transport performance in AMSSs. With the purpose of easy understating, comparisons and review of current status, the chapter is divided by sectors in 4 sections i.e. Land Transport, Air Transport, Maritime Transport and Transport Facilitation. Each section also describes a brief introduction to specific sector.

3.2 LAND TRANSPORT

Efficient land transport plays a vital role in fostering international trade with and within ASEAN region. The removal of barriers to trade in the land transport sector is therefore doubly important. First, the land transport sector is in itself an important area of economic activity, and further liberalization in transport will therefore make an important contribution in trade and services. Secondly, by enhancing efficiency and reducing the costs of trade in goods, removal of barriers in the land transport sector will in turn lead to freer and more open markets in the trading of physical goods and movement of natural persons. To do this in ways that protect the natural environment, promote growth, and meet the complex demands arising from new safety requirements will require an unprecedented commitment of skills and resources, and new levels of cooperation.

In addition to physical hardcore development, the soft component such as legal, regulatory, institutional, human resource, operational and technological developments will also play a vital role in facilitating the efficient and effective transport system.

The following sections will discuss the 3 major component of the land transport i.e. road, rail and inland waterways in AMSSs. These sections will discuss and compare the status of motorization, road and rail inventory, road safety, inland waterways route length, modal share etc. among others in AMSSs. The two major component of current ASEAN Transport Action Plan (ATAP) i.e. ASEAN Highways and Singapore-Kunming Rail Link (SKRL) which are also the priority projects under ASEAN Economic Community (AEC) blueprint are discussed in detail. During the discussion, the certain issues were also highlighted that will need a specific attention to improve the overall land transport performance.

3.2.1 MOTORIZATION

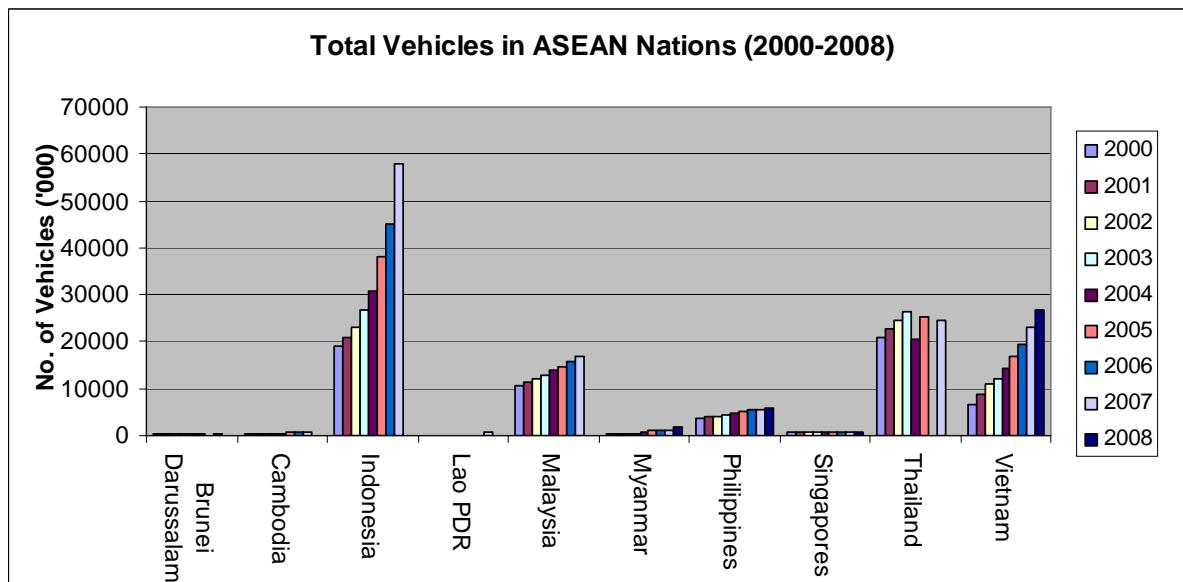
Economic growth is being accompanied by rapid traffic growth in AMSSs. Since 2000, the growth of motorization has been rapid in the ASEAN region. Yet, in comparison with other developed nations in the world, vehicle ownership is still low in ASEAN countries.

On analyzing the increase of automobiles in AMSSs, since 2000, the number of automobiles increased by more than double in ASEAN countries such as Cambodia, Myanmar, Indonesia and Viet Nam. This rapid increase without the corresponding expansion in infrastructure and road services resulted in traffic congestion, especially in the major cities of AMSSs. (Table 3-2-1 & Figure 3-2-1)

Table 3-2-1 Total Vehicle Registration (in '000)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	213	332	18,975	NA	10,599	439	3,701	693	20,836	6,695
2001	220	384	20,927	NA	11,303	445	3,866	708	22,589	8,916
2002	232	410	22,985	NA	12,022	462	4,188	707	24,517	10,880
2003	245	447	26,707	NA	12,819	476	4,292	711	26,379	12,054
2004	259	486	30,769	NA	13,765	760	4,761	727	20,625	14,150
2005	275	575	38,156	NA	14,816	979	5,060	755	25,266	16,978
2006	NA	714	45,081	NA	15,791	992	5,332	799	NA	19,589
2007	305	869	57,748	641	16,825	1,024	5,530	851	24,738	22,926
2008	NA	NA	NA	NA	NA	1,995	5,891	895	NA	26,624

Source: ASEAN Statistical Yearbook, 2008 and country websites/response NA – Not Available

**Figure 3-2-1 Increase in Total Registered Vehicles in AMSs (2000-2008)**

On comparing the number of vehicles per 1000 population in ASEAN nation then Brunei Darussalam, Malaysia, Thailand and Indonesia have comparatively the maximum number of registered vehicles per 1000 population. In 2005, Brunei Darussalam with 744 vehicles per 1000 population has the highest vehicle density. Cambodia and Myanmar, meanwhile, have the least number of vehicle densities among the AMSs. (Table 3-2-2)

Table 3-2-2 Number of Vehicles per 1,000 Populations

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	657	61	92	NA	451	9	48	172	334	90
2001	662	61	102	NA	471	9	49	171	359	97
2002	682	62	109	NA	490	9	52	169	390	NA
2003	700	66	125	NA	512	9	52	170	414	NA
2004	720	68	142	NA	538	14	57	172	333	NA
2005	744	70	174	NA	567	18	59	174	405	NA
2006	NA	NA	202	NA	593	18	61	182	NA	NA
2007	NA	NA	256	101	NA	18	62	186	375	263
2008	NA	NA	NA	NA	NA	34	65	185	NA	NA

Source: ASEAN Statistical Yearbook, 2008 and country websites/data.

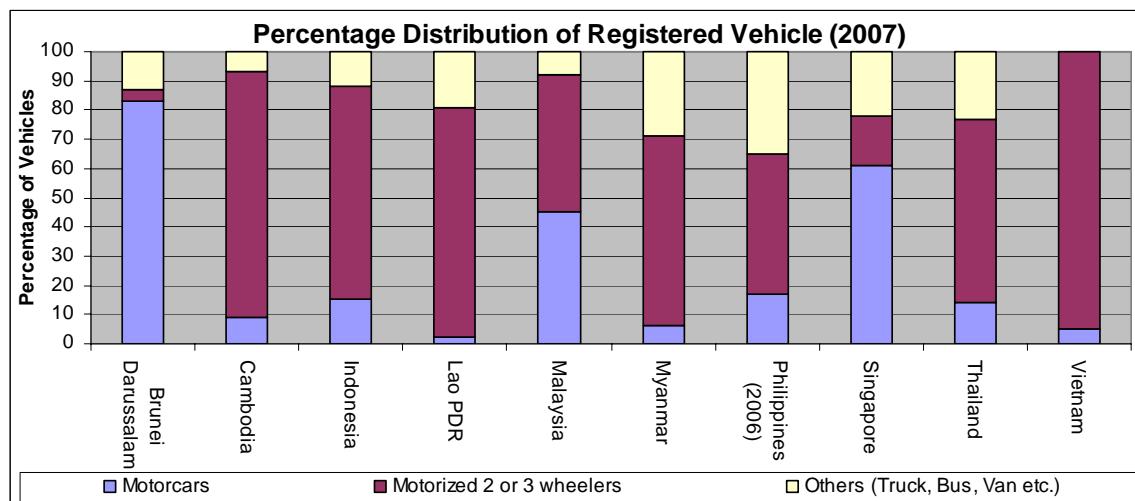
NA – Not Available

On comparing the distribution of registered vehicles, except for Brunei Darussalam and Singapore, the other AMSs are mainly dominated by two-wheelers. In 2007, of the total number of vehicles, the two-wheelers in Viet Nam and Cambodia are 95% and 84% respectively. (Table 3-2-3 and Figure 3-2-2). Such situation causes adverse impacts in terms of deterioration of environment, traffic congestions, accidents, energy waste, etc. Hence, there is a need for a modal shift to promote efficient, convenient and comfortable public transport especially in major cities in AMSs.

Table 3-2-3 Percentage Distribution of Registered Vehicles (2007)

Country	Motor cars	Motorized 2 or 3 wheelers	Others (Truck, Bus, Van etc.)
Brunei Darussalam	83	4	13
Cambodia	9	84	7
Indonesia	15	73	12
Lao PDR	2	79	19
Malaysia	45	47	8
Myanmar	6	65	29
Philippines (2006)	17	48	35
Singapore	61	17	22
Thailand	14	63	23
Viet Nam	5	95	0

Source: WHO & UN-ESCAP websites

**Figure 3-2-2 Percentage Distribution of Registered Vehicles (2007)**

3.2.2 ROAD NETWORK INVENTORY

The road network and road length vary by country. Considering the total road length and paved road length, Indonesia has the largest network with 396,362 km (2007) and largest paved road length 221,905 km (2007) among the ASEAN member nations. Since 2000, Viet Nam made considerable progress and enhanced its road network length by more than ten (10) times, from 15,436 km in year 2000 to 160,089 km in 2007. Viet Nam also improved its paved road network by about seven times from 11,206 km in 2000 to 76,241 km in 2007. Thailand, Myanmar and Lao PDR also made a substantial progress in enhancing their total road network and paved road network. (Table 3-2-4, Table 3-2-5, Figure 3-2-3 and Figure 3-2-4)

Table 3-2-4 Total Road Length (in km)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	3,272	NA	355,951	25,090	66,445	28,596	29,056	3,100	50,724	15,436
2001	3,299	NA	361,782	25,090	71,814	28,790	29,878	3,120	51,544	15,571
2002	3,358	NA	368,362	32,625	72,165	28,790	30,030	3,150	53,761	NA
2003	3,471	NA	370,516	31,204	77,200	28,978	26,572	3,165	53,176	NA
2004	3,560	35,769	372,629	31,209	77,695	90,713	27,853	3,188	51,778	137,359
2005	3,650	NA	391,009	33,861	87,025	92,859	28,664	3,234	51,467	NA
2006	3,728	39,000	393,794	35,260	90,127	104,058	29,208	3,262	NA	NA
2007	NA	11,494	396,362	73,323	NA	111,737	29,370	3,297	98,053	160,089
2008	NA	NA	NA	NA	NA	125,355	29,650	3,325	NA	NA

Source: ASEAN Statistical Yearbook, 2008 and country websites/data.

NA – Not Available

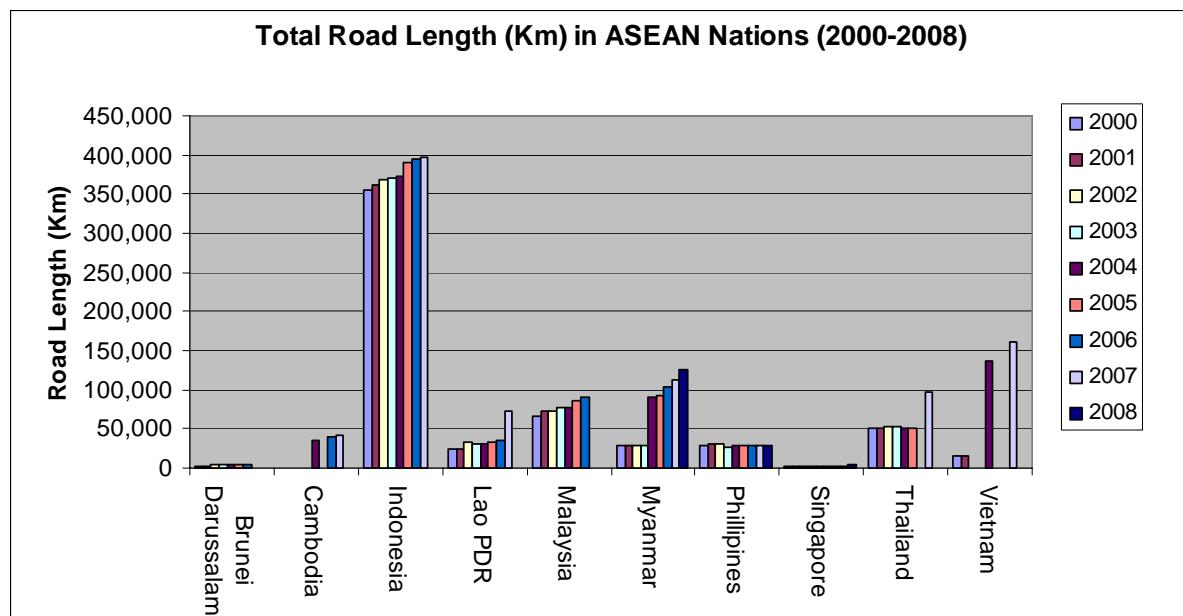


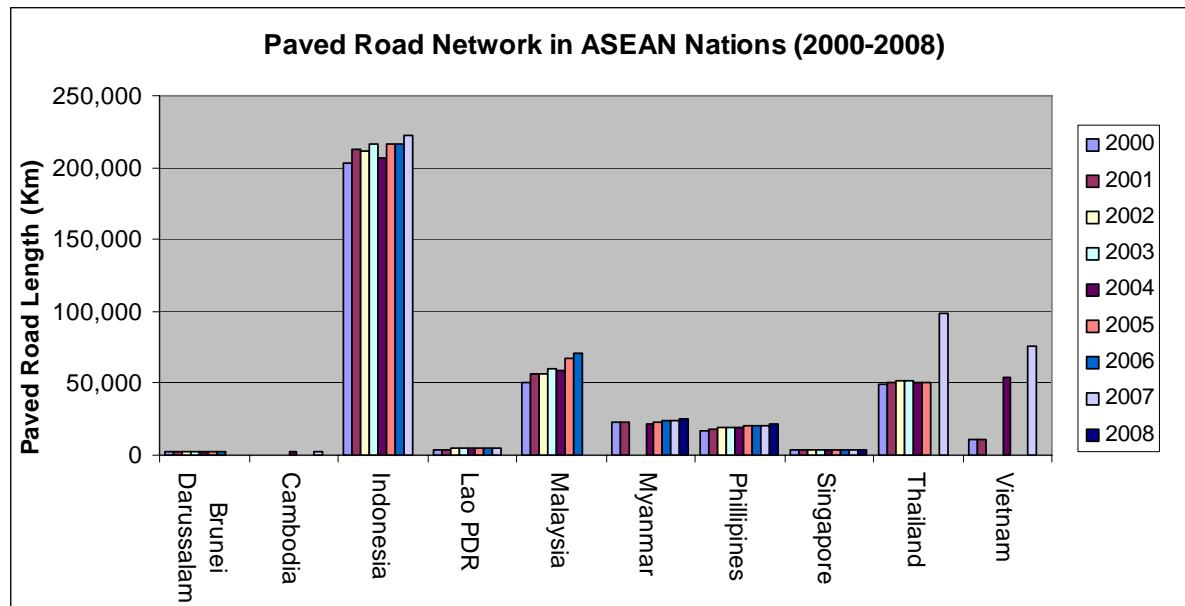
Figure 3-2-3 Growth of Total Road Length (km) in AMSs (2000-2008)

Table 3-2-5 Paved Road Length (in km)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	2,397	NA	203,214	3,897	50,621	22,630	17,020	3,091	49,166	11,206
2001	2,424	NA	212,935	3,897	55,933	23,179	18,144	3,119	50,992	11,258
2002	2,468	NA	211,998	4,592	56,366	NA	18,959	3,149	51,670	NA
2003	2,702	NA	216,109	4,491	59,513	NA	18,767	3,164	51,360	NA
2004	2,780	2,886	206,144	4,497	59,254	22,153	19,768	3,188	50,321	53,610
2005	2,819	NA	216,714	4,586	67,851	22,830	20,082	3,234	50,151	NA
2006	2,843	NA	216,545	4,548	71,292	23,880	20,502	3,262	NA	NA
2007	NA	2,376	221,905	5,133	NA	24,374	21,006	3,297	97,988	76,241
2008	NA	NA	NA	NA	NA	24,684	21,677	3,325	NA	NA

Source: ASEAN Statistical Yearbook, 2008 and country websites

NA – Not Available

**Figure 3-2-4 Growth of Paved Road Network in AMSs (2000-2008)**

However, based on comparison of the percentage of paved road networks, Singapore and Thailand lead among the ASEAN countries, with approximately 100% paved network. Cambodia and Lao PDR have the lowest percentage with below 7% of paved road network. These nations have an exceptional task ahead and will require immense efforts and resources to match with the leading AMSs. (Table 3-2-6).

Table 3-2-6 Percentage of Paved Road Network

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	73.3%	NA	57.1%	15.5%	76.2%	79.1%	58.6%	99.7%	96.9%	72.6%
2001	73.5%	NA	58.9%	15.5%	77.9%	80.5%	60.7%	100.0%	98.9%	72.3%
2002	73.5%	NA	57.6%	14.1%	78.1%	NA	63.1%	100.0%	96.1%	NA
2003	77.8%	NA	58.3%	14.4%	77.1%	NA	70.6%	100.0%	96.6%	NA
2004	78.1%	8.1%	55.3%	14.4%	76.3%	24.4%	71.0%	100.0%	97.2%	39.0%
2005	77.2%	NA	55.4%	13.5%	78.0%	24.6%	70.1%	100.0%	97.4%	NA
2006	76.3%	NA	55.0%	12.9%	79.1%	22.9%	70.2%	100.0%	NA	NA
2007	NA	5.7%	56.0%	7.0%	NA	21.8%	71.5%	100.0%	99.9%	47.6%
2008	NA	NA	NA	NA	NA	19.7%	73.1%	100.0%	NA	NA

Source: ASEAN Statistical Yearbook, 2008 and country websites

NA – Not Available

Road density is another important parameter for comparison and analysis of the progress of road development. Singapore has the highest road density (road length) with 4,702 km road length per 1000 sq km of country area. It is followed by Brunei Darussalam, with a road density of 646 km per 1000 sq km of area. The Philippines has the lowest road density with 98.8 km road length per 1000 sq km of area. Viet Nam, Myanmar and Thailand made considerable progress in improving their respective road densities. (Table 3-2-7)

Table 3-2-7 Road Density (Road Length per 1000 sq km of total area)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	567.6	NA	191.3	106.0	201.2	42.3	96.9	4,384.1	98.9	46.6
2001	572.2	NA	194.5	106.0	217.5	42.6	99.6	4,412.4	100.5	47.0
2002	582.5	NA	198.0	137.8	218.5	42.6	100.1	4,454.8	104.8	NA
2003	602.1	NA	199.2	131.8	233.8	42.8	88.6	4,476.0	103.6	NA
2004	617.5	197.6	200.3	131.8	235.3	134.1	92.8	4,508.6	100.9	414.7
2005	633.1	NA	210.2	143.0	263.5	137.2	95.5	4,573.6	100.3	NA
2006	646.7	215.4	211.7	148.9	272.9	153.8	97.4	4,613.2	NA	NA
2007	NA	229.2	213.1	309.6	NA	165.2	97.9	4,662.7	191.1	483.3
2008	NA	NA	NA	NA	NA	185.3	98.8	4,702.3	NA	NA

Source: ERIA Study Team (based on data from ASEAN Statistical Yearbook, 2008 and country data) NA – Not Available

3.2.3 ASEAN HIGHWAY AND CROSS BORDER LINKAGES

During the fifth ASEAN Transport Ministers' meeting in Hanoi in September 1999, the Ministerial Understanding on the Development of the ASEAN Highway Network Project was signed, which spelled out a plan of action to achieve the goal. Based on each member state's road conditions, ASEAN has identified the highway network, which consists of 23 designated routes, totalling approximately 38,400 km (Figure 3-2-5).

It is noted that the ASEAN highway network also consist of a part of the Trans-Asian Highway network. In other words, the said network is composed of the Asian Highway that passes through AMSs (shown in red in Figure 3-2-5) and an additional network as shaded in yellow in Figure 3-2-5.

The following time frame was developed and agreed for the accomplishment of ASEAN Highway network:

- Stage - 1 (by 2000)
 - Network configuration and designation of national routes.
- Stage -2 (by 2004)
 - Installation of road signs at all designated national routes. All designated routes to be upgraded to at least Class III standards.
 - All missing links to be constructed and cross-border points will be designated.
- Stage- 3 (by 2020)
 - All designated routes are to be upgraded to at least Class I standards. For low traffic volume non-arterial routes, Class II standards would be acceptable.



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-5 ASEAN Highway Network (includes Asian Highway)

It is interesting to note and analyze the respective physical (highway) linkages among AMSs. However, this mainly depends on the number of neighbouring borders and geographical location of each nation. For example, the Philippines, due to its geographical location and is surrounded by sea. Hence, it does not share its border and has no highway linkages with any other ASEAN countries.

Thailand has 13 highway linkages with four neighbouring States (Cambodia, Lao PDR, Malaysia and Myanmar), which is also the highest among ASEAN members states. This is followed by Lao PDR and Malaysia. (Refer Table 3-2-8, Figure 3-2-6 and Figure 3-2-7).

It is noted that despite sharing its border, Lao PDR and Myanmar do not have any direct highway linkages between them. The AH-2 and AH-3 passing through Thailand connects both the nations.

Table 3-2-8 ASEAN Highway Cross Border Links between the Nations

	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Brunei Darussalam					✓(2)					
Cambodia				✓(1)					✓(2)	✓(1)
Indonesia					✓(2)					
Lao PDR		✓(1)							✓(5)	✓(5)
Malaysia	✓(2)		✓(2)					✓(1)	✓(2)	
Myanmar										✓(4)
Philippines										
Singapore					✓(1)					
Thailand		✓(2)		✓(5)	✓(2)	✓(4)				
Viet Nam		✓(1)		✓(5)						
Total Number of Linkages	2	4	2	11	7	4	0	1	13	6
Total Country Linkages	1	3	1	3	4	1	0	1	4	2

Source: ERIA Study Team

Note- The number in parenthesis indicates the number of physical highway link between the two nations.

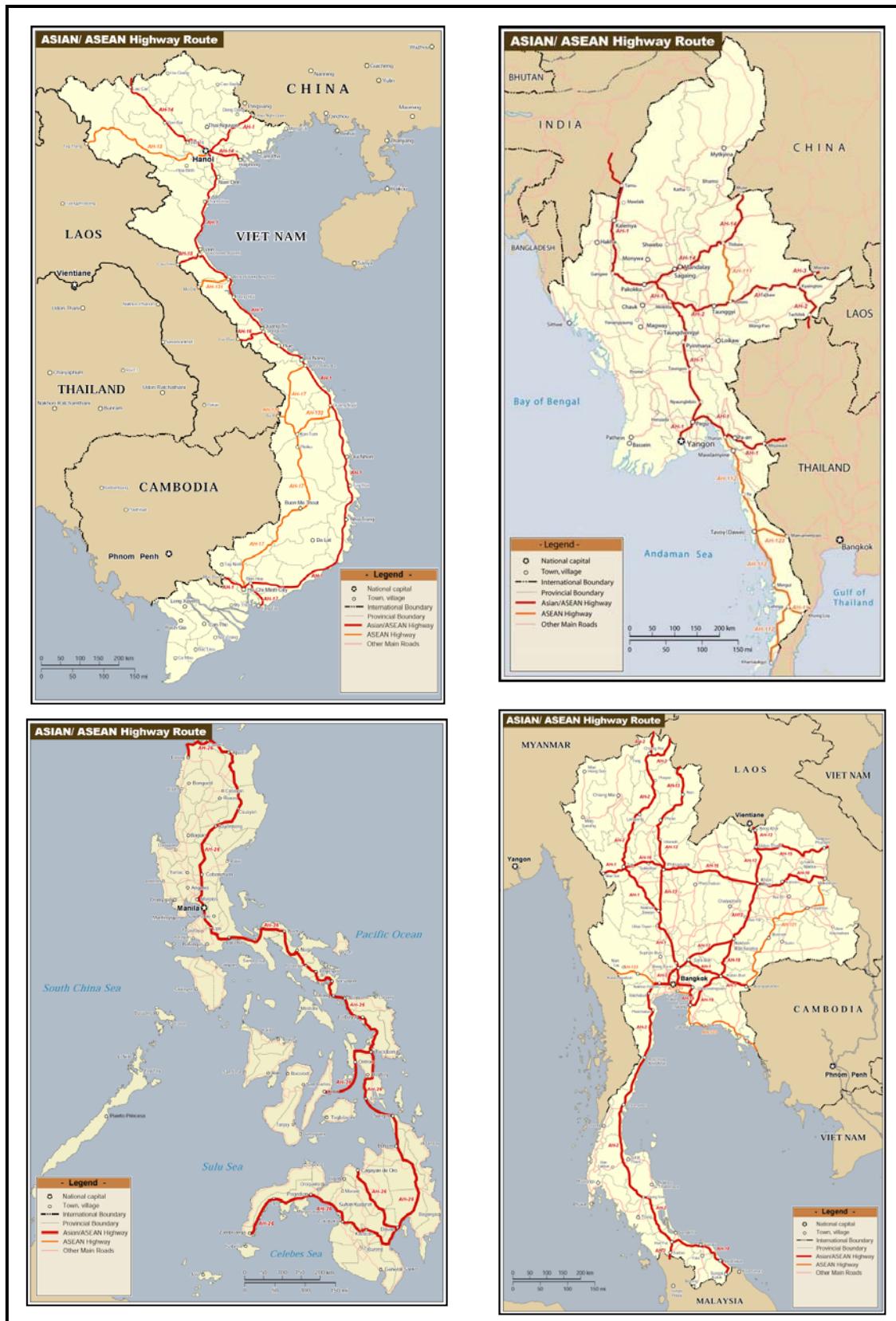
✓ means that there is physical highway links between the two countries.

Blank boxes means either non-existence (or not applicable) of physical links between the two nations.



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-6 Highway Network in AMSs (1 of 2)



As stated earlier, ASEAN highway also constitutes a part of Trans-Asian Highway. On strictly reviewing only the Asian highway component in ASEAN countries, it reveals that in 2008, Lao PDR, Cambodia, Myanmar, the Philippines and Viet Nam did not have 'Primary' standard roads. In Lao PDR and Cambodia, even the Class-I standard roads do not exist and is mainly dominated by Class-III standard roads. These nations had a massive task ahead to improve the quality of highway roads. (Table 3-2-9 and Figure 3-2-8).

Based on the analysis of the progress made since 2004, Indonesia, Malaysia, Myanmar, the Philippines and Thailand were able to increase the lengths of their Class-I standard roads. However, still significant percentages of Class-III, or below standard roads, exist in Myanmar, Cambodia, Lao PDR and the Philippines.

Table 3-2-9 Inventory of Asian Highway (km) in AMSs (2004-2008)

Nations	Primary			Class-I			Class-II			Class-III			Below Class-III & Others		
	2004	2006	2008	2004	2006	2008	2004	2006	2008	2004	2006	2008	2004	2006	2008
Cambodia	0	0	0	0	0	0	398	453	453	743	879	883	199	3	2
Indonesia	335	409	409	18	188	592	1600	1734	3,219	1965	1550	0	34	89	34
Lao PDR	0	0	0	0	0	0	0	0	244	2375	2032	1,967	3	285	107
Malaysia	795	795	795	67	67	148	733	733	636	0	0	0	0	0	0
Myanmar	0	0	0	147	147	173	144	0	35	983	1585	1,585	1729	1271	1216
Philippines	0	0	0	17	134	161	27	928	2,818	2,872	1917	0	601	538	538
Singapore	11	1	11	8	8	8	0	0	0	0	0	0	0	0	0
Thailand	182	182	182	2572	2926	3,049	1,226	1,187	1,723	1,128	813	155	4	2	2
Viet Nam	0	0	0	408	338	344	1915	2018	2,150	104	85	0	251	190	137
Total (km)	1323	1387	1397	3237	3808	4475	6043	7053	11278	10170	8861	4590	2821	2378	2036

Source: Statistical Yearbook for Asia and the Pacific 2008, UNESCAP and UN-ESCAP website

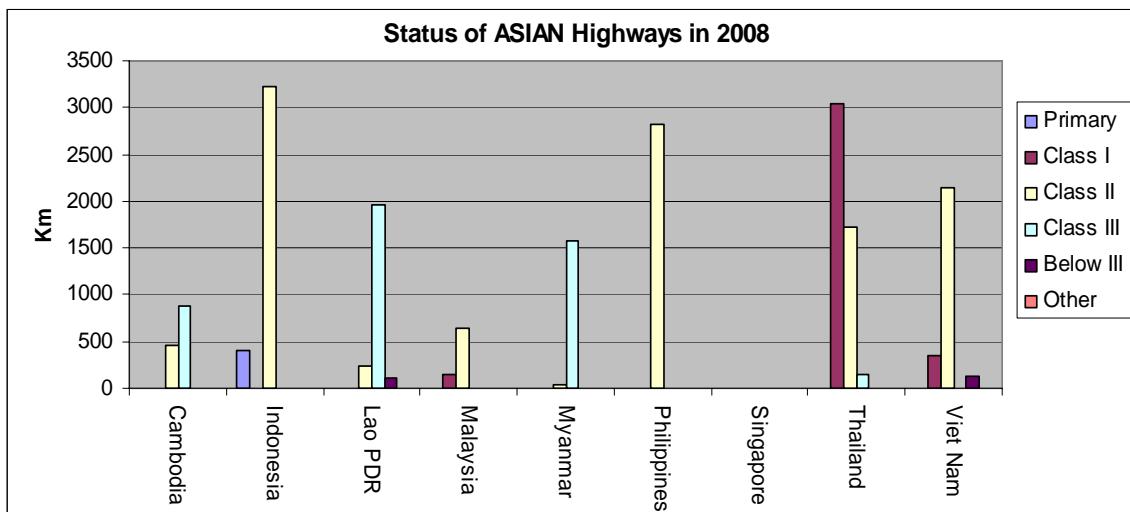


Figure 3-2-8 Status of Asian Highways in 2008 in AMSs

On further reviewing in detail the Asian Highway network, it is quite interesting to note the continuation of certain Highway links across the sea/river and their connectivity by 'Ferry Links'. For example, AH2 and AH25 in Indonesia are in the separate island in Indonesia and are connected by means of 'Ferry Link'. On reviewing such ferry links as mentioned under Asian Highway Network in context of ASEAN regions then there are seven (7) ferry links in 3 AMSs as shown in Table 3-2-10 and Figure 3-2-9 that connects the Asian Highway network.

Table 3-2-10 Ferry Links in the AMSs in Asian Highways

Country	Route Number	Origin-Destination	Length of Ferry Links (km)
Cambodia	AH-1	Mekong River Ferry Crossing-Neak Loeung	1.5 km
	AH-11	Rapeangkreal (Border of Lao PDR) - Stung Treng	0.7 km
Indonesia	AH-2	Gilimanuk Terminal -Banyuwangi Terminal	8 km
	AH-25	Bakauheni Ferry Terminal -Merak Ferry Terminal	26 km
Philippines	AH-26	Matnog Terminal - Allen Terminal	25 km
	AH-26	Ormoc Terminal - Cebu Terminal	65 km
	AH-26	Liloan Ferry Terminal -San Francisco Madilao Port	61.05 km

Source: UN-ESCAP website and country data



Source: UNESCAP website

Figure 3-2-9 Ferry Links in Asian Highways in ASEAN Region

Prior to discussing and comparing the progress that has been achieved in the implementation of the ASEAN Highways, it is important to understand the standards that has been adopted for the classification of ASEAN highways in four categories i.e. Primary, Class I, Class II, and Class III. The highways that does not match to the standards adopted for the lowest category i.e. Class III are considered under “Below Class III” category. The Table 3-2-11 provides the details of standards as adopted for ASEAN Highways.

Table 3-2-11 ASEAN Highway Standards

Highway Classification			Primary (4 or more lanes) (control access)			Class I (4 or more lanes)			Class II (2 lanes)			Class III (2 lanes)				
Terrain classification			L	R	M	L	R	M	L	R	M	L	R	M		
Design speed (km/h)			100-120	80-100	60-80	80-110	60-80	50-70	80-100	60-80	40-60	60-80	50-70	40-60		
Width (m)	Right of way		(50-70) ((40-60))			(50-70) ((40-60))			(40-60) ((30-40))			30-40				
	Lane		3.75			3.50			3.50			3.00 [3.25]				
	Shoulder		3.0		2.5	3.0		2.5	2.5		2.0	1.5 [2.0]		1.0 [1.5]		
Min. horizontal curve radius (m)			390	230	120	220	120	80	200	110	50	110	75	50		
Type of pavement			Asphalt/cement concrete			Asphalt/cement concrete			Asphalt/cement concrete			Double bituminous treatment				
Max. super elevation (%)			(7) ((6))			(8) ((6))			(10) ((6))			(10) ((6))				
Max. vertical grade (%)			4	5	6	5	6	7	6	7	8	6	7	8		
Min. vertical clearance (m)			4.50 [5.00]			4.50 [5.00]			4.50			4.50				
Structure loading (minimum)			HS20-44			HS20-44			HS20-44			HS20-44				

Note:

1. Abbreviation: L = Level Terrain M = Mountainous Terrain R = Rolling Terrain

2. () = Rural () = Urban

3. [] = Desirable Values

4. The right of way width, lane width, shoulder width and max. superelevation rate in urban or metropolitan area can be varied if necessary to conform with the member countries design standards.

Source : www.aseansec.org/ahnp_b.htm

On comparing the ASEAN Highway status between 2004 and 2008 as shown in Table 3-2-12, it reveals that some of the AMSs are still struggling to meet the targets set for ASEAN highways. As per ASEAN Highway targets, by the year 2004, all designated routes need to be upgraded to at least Class III standards and all missing links need to be constructed. As per Table 3-2-12, in 2008, below Class-III standard roads still exists in Indonesia, Lao PDR, Malaysia, Myanmar and Viet Nam. A large percentage of the total road networks in Myanmar still fall below Class-III category. In 2008, missing links also exist in Indonesia and Myanmar.

Table 3-2-12 Comparison of the ASEAN Highways Status between 2004 & 2008 in AMSs

Country	Total Length (km)		Primary (km)		Class I (km)		Class II (km)		Class III (km)		Below Class III (km)		Missing Links (km)	
	2004	2008	2004	2008	2004	2008	2004	2008	2004	2008	2004	2008	2004	2008
Brunei Darussalam	168.0	168.0	62.0	-	8.5	66.0	97.5	98.8	-	3.2	-	-	-	-
Cambodia	1506.5	1486.8	-	-	-	-	371.6	1335.8	994.9	151.0	140.1	-	-	-
Indonesia	9239.0	9928.4	344.0	80.0	546.0	437.5	2518.0	3947.4	4469.0	4075.4	1362.0	1362.0	-	26
Lao PDR	2956.0	2702.4	-	-	-	-	-	227.6	2336.0	1861.8	620.0	613.0	-	-
Malaysia	4410.9	4393.5	1060.3	1060.3	74.0	74.0	1847.6	1830.2	1389.0	1389.0	40.0	40.0	-	-
Myanmar	4543.0	4534.0	-	-	147.0	157.0	-	-	1032.0	1385.0	3163.0	2791.0	201	201
Philippines	2983.0	3563.9	-	71.0	469.0	196.1	637.0	8.4	1877.0	2990.8	-	-	-	-
Singapore	38.0	38.0	28.0	28.0	10.0	10.0	-	-	-	-	-	-	-	-
Thailand	6692.5	6669.2	350.1	386.6	4579.2	4695.4	1322.3	1394.4	424.9	192.8	16.0	-	-	-
Viet Nam	4532.0	4206.6	-	32.3	419.0	414.9	2441.0	2298.7	355.0	955.8	1317.0	505.2	-	-
Total	37068.9	37690.9	1844.4	1658.2	6252.7	6050.9	9235.0	11141.3	12877.8	13004.9	6658.1	5311.2	201	227

Source: The 2004 data is from ASEAN Highway Fact Book and the complied data for 2008 received from the Department of Highways, Thailand.

'-' means not applicable

It is to be noted that to facilitate transportation of goods in transit and to further integrate the region's economies, the priority routes such as 'Transit Transport Routes (TTR)' were identified in ASEAN highway network and are discussed in detail in the next section. However, as TTR routes are vital for regional and economic integration, the upgrading of TTR routes will always be the priority. On analyzing in detail the status of ASEAN Highways

in 2008 as shown in Table 3-2-13, there are still certain sections in TTR that are below Class-III standard. In TTR and other ASEAN Highways, the below Class-III standard roads still exist in Indonesia (AH-150, AH-151, AH-25), Lao PDR (AH12, AH15, AH-131, AH-132), Malaysia (AH-150), Myanmar (AH-1, AH-2, AH-3, AH-111, AH-112, AH-123) and Viet Nam (AH-13, AH-132). In Viet Nam, recently, the below Class III section on AH14 has been upgraded. To enhance trade and tourism, it is vital to upgrade these sections with a priority on the sections along the TTR.

Table 3-2-13 The ASEAN Highways Route Status in 2008 in AMSs

Country	Route No.	Itinerary	Total Length (km)	Primary (km)	Class I (km)	Class II (km)	Class III (km)	Below Class III (km)	Missing Links (km)	Transit Transport Routes Length (TTR) in km
Brunei Darussalam	AH 150	Sg. Tujuh - Kuala Lurah, Puni (Brunei Darussalam Check Point) - Labu (Brunei Darussalam Check Point)	168.0	-	66.0	98.8	3.2	-	-	168 km
Cambodia	AH 1	Poi Pet - Sisophon - Phnom Penh - Bavet	573.0	-	-	573.0	-	-	-	574 km
	AH 11	Sihanoukville - Phnom Penh - Kampong Cham - Stung Treng - Trapeangkreal	762.8	-	-	762.8	-	-	-	764 km
	AH 123	Cham Yeam - Koh Kong - Phum Daung Bridge - Sre Ambel - Chamkar Luong	151	-	-	-	151	-	-	-
Indonesia	AH 2	Merak - Jakarta - Semarang - Kartasura - Surabaya - Denpasar	1687.1	-	353.8	1333.3	-	-	-	1299 km
	AH 25	Banda Aceh - Medan - Pekanbaru - Jambi - Palembang - Lampung - Bakauheni - Merak	2783.3	-	33.7	1535.2	1188.4	-	-	2523 km
	AH 150	Serudong - Samarinda - Banjarmasin - Palangkaraya (Entikong) - Pontiana	3073.0	-	-	359.0	1530.0	1184.0	-	321 km
	AH 151	Tebingtinggi - Padang - Bangko - Lubuk Linggau - Terbanggi Besar	1719.0	-	-	357.0	1184.0	178.0	-	-
	AH 152	Jakarta - Bogor - Sukabumi - Bandung - Yogyakarta - Kartasura	666.0	80.0	50.0	363.0	173.0	-	-	-

Country	Route No.	Itinerary	Total Length (km)	Primary (km)	Class I (km)	Class II (km)	Class III (km)	Below Class III (km)	Missing Links (km)	Transit Transport Routes Length (TTR) in km
Lao PDR	AH 3	Boten - Nateuy - Houayxay	227.6	-	-	227.6	-	-	-	251 km
	AH 11	Vientiane - Ban Lao - Thakhek - Seno - Phia Fai - Veunkham	832.0	-	-	-	832.0	-	-	861 km
	AH 12	Nateuy - Oudomxai - Louang- Phrabang -Vientiane	703.3	-	-	-	410.3	293.0	-	682 km
	AH 13	Nam Ngeun - Oudomxai - Taichang	189.0	-	-	-	189.0	-	-	-
	AH 15	Thakhek - Ban Lao - Keoneau	132.8	-	-	-	34.8	98.0	-	136 km
	AH 16	Savannakhet - Seno - Densavanah	241.1	-	-	-	241.1	-	-	240 km
	AH 131	Thakhek - Kiamuoya	137.7	-	-	-	41.7	96.0	-	-
	AH 132	Phia Fai - Ban Het	239.0	-	-	-	113.0	126.0	-	-
Malaysia	AH 2*	Bukit Kayu Hitam - Kuala Lumpur - Senai Utara - Second Linkage	821.0	795.0	26.0	-	-	-	-	980 km
	AH 18*	Rantau Panjang - Kuantan - Johor Bharu	756.6	-	41.0	715.6	-	-	-	-
	AH 140	Sungai Petani - Gerek - Kota Bharu	330.0	-	-	-	330.0	-	-	-
	AH 141	Port Klang - Kuala Lumpur - Kuantan	272.3	265.3	7.0	-	-	-	-	-
	AH 142	Gambang - Yong Peng	200.0	-	-	-	200.0	-	-	-
	AH 143*	Senai Utara - Johor Bharu	19.0	-	-	19.0	-	-	-	-
	AH 150	Serian - Kuching, Tebedu - Serian - Sg. Tujuh, Kuala Lurah - Runi, Labu - Kota Kinabalu - Serudong	1994.6	-	-	1095.6	859.0	40.0	-	1262 km

Country	Route No.	Itinerary	Total Length (km)	Primary (km)	Class I (km)	Class II (km)	Class III (km)	Below Class III (km)	Missing Links (km)	Transit Transport Routes Length (TTR) in km
Myanmar	AH 1	Tamu - Mandalay - Meiktila - Yangon - Bago - Payagyi - Thaton - Myawadi	1656.0	-	80.0	-	1206.0	379.0	-	1665 km
	AH 2	Meiktila - Loilem - Kyaing Tong - Tachilek	807.0	-	10.0	-	349.0	448.0	-	807 km
	AH 3	Mongla - Kyaing Tong	93.0	-	-	-	93.0	-	-	93 km
	AH 14	Muse - Thibaw - Mandalay	453.0	-	67.0	-	386.0	-	-	453 km
	AH 111	Thibaw - Loilem	239.0	-	-	-	-	239.0	-	-
	AH 112	Thaton - Mawlamyine - Thanbuzayat - Ye - Dawei - Lehnya - Khamaukgyi, Lehnya - Khong Loy	1145.0	-	-	19.0	84.0	982.0	60.0	-
	AH 123	Dawei - Maesameepass	141.0	-	-	-	-	-	141.0	-
Philippines	AH 26**	Laoag City - Manila - Daet - Surigao - General Santos - Malabang - Zamboanga City	3,266.27	71.0	196.08	8.36	2,990.8	-	-	3073 km
Singapore	AH 2*	Woodlands Checkpoint - Pan Island Express - Upp Bukit Timah Rd - West Coast Highway	19.0	11.0	8.0	-	-	-	-	-
	AH 143*	Tuas Checkpoint - Clementi Road - West Coast Highway	19.0	17.0	2.0	-	-	-	-	-
Thailand	AH 1	Mae Sot - Tak - Nakhon Sawan - Bangkok - Hin Kong - Kabinburi - Aranyaprathet	715.5	44.6	531.3	139.5	-	-	-	702 km
	AH 2	Tachilek - Mae Sai - Chiang Rai - Tak-Bangkok - Pranburi - Hat Yai - Chang Lon	1913.6	110.4	1800.9	2.2	-	-	-	1923 km
	AH 3	Chiang Khong - Chiang Rai	121.2	-	11.4	50.6	59.2	-	-	115 km
	AH 12	Nongkhai - Udonthani - Khonkaen - Nakhon Ratchasima - Hin Kong	571.3	-	571.3	-	-	-	-	533 km
	AH 13	Huai Kon - Phitsanulok - Nakhon Sawan	550.5	-	343.6	206.9	-	-	-	-
	AH 15	Udonthani - Nakhon Phanom	248.7	-	82.1	166.6	-	-	-	-

Country	Route No.	Itinerary	Total Length (km)	Primary (km)	Class I (km)	Class II (km)	Class III (km)	Below Class III (km)	Missing Links (km)	Transit Transport Routes Length (TTR) in km
	AH 16	Tak - Phitsanulok - Lom Sak - Khonkaen - Mukdahan	703.4	-	324.4	322.7	56.4	-	-	713 km
	AH 18	Hat Yai - Sungai Kolok	311.1	-	311.1	-	-	-	-	-
	AH 19	Nakhon Ratchasima - Kabinburi - Chonburi - Bangkok	364.1	78.9	285.2	-	-	-	-	491 km
	AH 112	Khlong Loy - Bang Saphan	28.0			13.0	15.0			-
	AH 121	Mukdahan - Suwannaphum - Buriram - Aranyaprathet - Sa Kaeo	507.6	-	90.4	370.0	47.2	-	-	-
	AH 123	Myanmar Border - Bangkok - Chonburi - Chanthaburi - Hat Lek	634.2	152.7	343.6	122.8	15.1	-	-	-
Viet Nam	AH 1	Huu Nghi Quan - Hanoi - Vot (South of Vinh) - West Vung Ang Port - Dong Ha - Da Nang - West of Hoi An - Quang Ngai - Nha Trang - Bien Hoa - Ho Chi Minh City - Moc Bai	1803.0	32.3	88.5	1323.6	358.6	-	-	296 km
	AH 13	Tay Trang - Dien Bien - Tuan Giao - Son La - Hoa Binh - Ha Noi	499.5	-	8.2	-	279.3	215.5	-	-
	AH 14	Lao Cai - Doan Hung - Hanoi - Hai Phong	427.5	-	156.1	30.8	115.6	183.0***	-	-
	AH 15	Cau Treo - Vot (South of Vinh)	99.3	-	-	14.0	85.3	-	-	123 km
	AH 16	Lao Bao - Dong Ha	84.0	-	-	84.0	-	-	-	83 km
	AH 17	West of Hoi An - Thanh My - Kon Tum - Play Cu - Ban Me Thuot - Chon Thanh - An Suong - Bien Hoa - Vung Tau	958.5	-	162.1	737.4	59.0	-	-	75 km
	AH 131	Mu Da - West of Vung Ang Port	137.0	-	-	99.0	38.0	-	-	-
	AH 132	Bo Y - Dak To - Kon Tum - Quang Ngai	198.2	-	-	10.0	20.0	160.0	-	-

Source: The 2004 data is from ASEAN Highway Fact Book and the complied data for 2008 received from the Department of Highways, Thailand.

Final route numbering between Malaysia and Singapore is subject to consultation between both countries. **No Inventory data for 211.50 km.

Note: AH1, AH2, AH3, AH11, AH12, AH13, AH14, AH15, AH16, AH18, AH19 and AH25 are also a part of Trans Asian Highways.

'-' means 'Not Applicable' (no road length reported in that Class category)

*** Recently, this section has been upgraded.

On analyzing the traffic volume and number of lanes, it was observed that volume of traffic is large on highways such as that linking Singapore and Bangkok, Thailand, in the northern islands of the Philippines and in the Java region of Indonesia. On comparing the traffic volume with the number of existing lanes, it is interesting to note that except the highway that links Singapore and Bangkok, others mainly consist of two-lane roads only. To enhance the trade activities among AMSs, it is vital to improve the road infrastructure and quality of roads of the other highways. (Figure 3-2-10 and Figure 3-2-11).



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-10 Number of Lanes in Asian Highways



Source : ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-11 Traffic Volume on Asian Highways

3.2.4 TRANSIT TRANSPORT ROUTES (TTR)

To facilitate transportation of goods in transit, support the implementation of the ASEAN Free Trade Area (AFTA), and further integrate the region's economies, priority routes classified as 'Transit Transport Routes (TTR)' were identified. The 35 sections on various ASEAN Highways across AMSs were designated as TTR. The details of the routes are shown in Table 3-2-14, Figure 3-2-12 and Figure 3-2-13.

Table 3-2-14 Details of Designated TTR

Country	Route No.	Origin-Destination	Length (km)
Brunei Darussalam	AH-150	Sungai Tuoh/Miri (Brunei Darussalam / Malaysia Check Point) - Kuala Lurah/Limbang (Brunei Darussalam/Malaysia Check Point)	140
	AH-150	Puni/Limbang (Brunei Darussalam/Malaysia Check Point) - Labu/Lawas (Brunei Darussalam/Malaysia Check Point)	28
Cambodia	AH-1	Poi Pet (Cambodia/Thailand Border) - Sisophon - Phnom Penh - Bavet (Cambodia /Viet Nam Border)	574
	AH-11	Trapeing Kreal (Cambodia /Lao PDR Border) - Stung Treng - Kampong Cham - Phnom Penh - Sihanoukville Port	674
Indonesia	AH-2	Merak - Jakarta - Surakarta -Surabaya - Denpasar	1,299
	AH-150	Pontianak - Entikong/Tebedu (Indonesia/Malaysia, Sarawak Border)	321
	AH-25	Banda Aceh - Medan -Palembang - Bakahuni	2,523
Lao PDR	AH-3	Boten (Lao PDR/China Border) - Luang Namtha -Houi Sai (Lao PDR/Thailand border)	251
	AH-12	Natrey (J.R.AH.3)-Oudomsay - Luang Phrabang - Vientiane	682
	AH-11	Vientiane (J.R.AH.12) - Ban Lao - Thakhek - Savannakhet - Pakse - Veunkhame (Lao PDR/Cambodia Border)	861
	AH-15	Namphao (Lao PDR/Viet Nam Border)- Ban Lao (J.R.AH.11)	136
	AH-16	Savannakhet (Lao PDR/Thailand Border) -Danesavanh (Lao PDR/ Viet Nam Border)	240
Malaysia	AH-2	Bukit Kayu Hitam (Malaysia/Thailand Border) - Kuala Lumpur - Seremban - Senai Utara - Tanjung Kupang	980
	AH-150	Entikong/Tebedu (Indonesia/Malaysia Border) - Serian - Kuching	106
	AH-150	Serian - Sibu - Bintulu - Miri	861
	AH-150	Miri - Sg. Tuoh (Malaysia/Brunei Darussalam Check Point)	24
	AH-150	Kuala Lurah (Malaysia/Brunei Darussalam Check Point) - Limbang/Puni (Malaysia/ Brunei Darussalam Check Point)	45
	AH-150	Lawas/Labu (Malaysia/Brunei Darussalam Check Point) -Kota Kinabalu	226
Myanmar	AH-1	Tamu (Myanmar/India Border) - Mandalay - Meiktila – Payagyi (including Payagyi- Yangon) - Myawadi (Myanmar/Thailand Border)	1,665
	AH-2	Meiktila - Loilem - Keng Tung - Tachileik (Myanmar/ Thailand Border)	807
	AH-3	Kyaington (Keng Tung) - Mongla	93
	AH-14	Muse (Myanmar/China Border) - Mandalay	453

Country	Route No.	Origin-Destination	Length (km)
Philippines	AH-26	Laoag City-Manila-Matnog-(Ferry Service)- Allen or (DapDap) - Tacloban City - Liloan (Ferry Service) or (San Ricardo) - Lipata - Surigao City - Davao City - General Santos City - Cotabato City - Zamboanga City	3,073
Singapore		Designated Transit Transport Routes to be submitted at the time of deposit of Instrument of Ratification.	
Thailand	AH-1	Mae Sot (Thailand/Myanmar Border) - Tak - Bangkok - Hin Kong - Nakhon Nayok - Aranyaprathet - Khlong Luek (Thailand/Cambodia Border)	702
	AH-2*	Mae Sai (Thailand/Myanmar border) - Chiang Rai - Lampang - Tak - Bangkok (West Outer Ring Road) - Nakhon Pathom - Pak Tho - Chumphon - Suratthani - Phattalung - Hat Yai - Sadao (Thailand/Malaysia Border)	1,923
	AH-3	Chiang Rai - Chiang Khong (Thailand/Lao PDR Border)	115
	AH-12	Hin Kong - Saraburi - Nakhon Ratchasima - Khon Kaen - Nongkhai (Thailand/Lao PDR Border)	533
	AH-16	Tak - Phitsanulok - Khon Kaen - Kalasin - Somdet - Mukdahan (Thailand/Lao PDR Border)	713
	AH-19	Nakhon Ratchasima - Kabinburi - Laem Chabang East Outer Bangkok Ring Road (Tub Chang) - Bang Pa In	491
Viet Nam	AH-1	Moc Bai (Viet Nam/CambodiaBorder) - An Suong (Ho Chi Minh City)	99
	AH-1	Dong Ha – Da Nang/Tien Sa	197
	AH-15	Keo Nua (Viet Nam/Lao PDR Border) - Bai Vot - Vinh - Cua Lo	123
	AH-16	Lao Bao (Viet Nam/Lao PDR Border) - Dong Ha	83
	AH-17	Dong Nai - Vung Tau	75

*Including length between Tak - Bangkok 363 kms which is part of AH.- 1

Source: ASEAN website



Source: Land Transport Working Group Meetings

Figure 3-2-12 Transit Transport Routes along ASEAN Highways (1 of 2)



Source: Land Transport Working Group Meetings

Figure 3-2-13 Transit Transport Routes along ASEAN Highways (2 of 2)

3.2.5 URBAN TRANSPORT

As a result of rapidly growing motorization, many cities in the region are facing serious problems, including significant levels of traffic congestion, air pollution from transport sources, high rates of traffic accidents and inadequate access to transport facilities especially for poor and vulnerable groups, such as people with disabilities. Some of the most rapid increases in motorization have taken place in major cities and capital cities in ASEAN countries. The dominant transport mode in cities like Hanoi includes two and three wheelers. The central parts of capitals are particularly congested, with weekday peak-hour traffic speeds reported to be very low resulting in long travel time. The deteriorating urban environment threatens the “liveability” and productivity of many cities.

Public transport has a very important role in urban transportation. Except in Singapore where the modal share of public transport is more than 70%, other major ASEAN cities are still struggling to improve the public transport services and share. Despite Jakarta’s successful

implementation of the Bus Rapid Transit (BRT) systems, its share remains low. Compared to rail-based mass transit systems, the BRT system tends to be much cheaper, faster to construct, more profitable to operate and economical to commuters. Hence, such system needs to be promoted and developed in other major ASEAN cities and capitals. Considering the environment performances, there is also a need to improve street furniture, pedestrian facilities and encourage the use of bicycles for short distance travels.

3.2.6 ROAD SAFETY

According to a 2004 study by the Asian Development Bank (ADB), road crashes killed more than 75,000 people and injured around 4.7 million in AMSs. In addition, it is estimated that annually, 25 million people are directly affected by road trauma which lead to economic hardships.

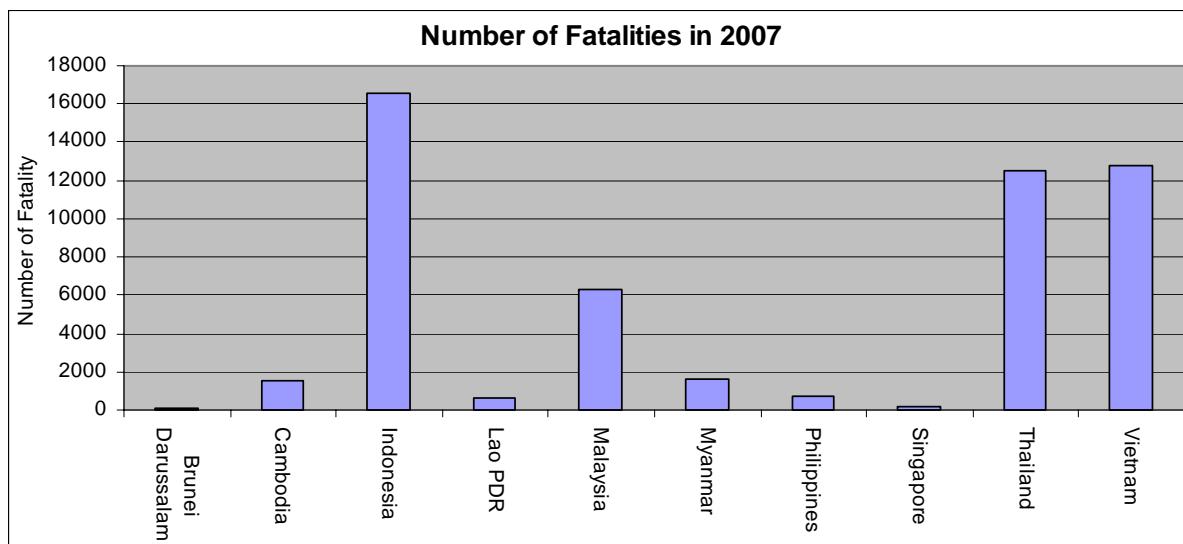
Motorization is increasing significantly within ASEAN as an outcome of economic growth. The number of registered motor vehicles continues to escalate, especially motorcycles. This type of vehicle is the most popular within the region due to its relatively low cost and suitability to the environment. In some AMSs like Viet Nam, the number of motorcycles represents approximately 95% of the overall vehicle fleet.

It is estimated that 310,000 lives were lost and about 20 million were injured on the region's roads over the last five years. The cost in economic terms is huge, with approximately USD \$15 billion or equivalent to 2.23% of ASEAN gross domestic product annually. In 2007, among the ASEAN countries, the numbers of fatalities were highest in Indonesia followed by Viet Nam, Thailand and others (Table 3-2-15 and Figure 3-2-14)

Table 3-2-15 Number of Fatalities and Injuries in 2007

Country	Number of Fatalities (2007)	Number of Non-Fatalities (Injured) (2007)
Brunei Darussalam	54	556
Cambodia	1545	25858
Indonesia	16548	66040
Lao PDR	608	8714
Malaysia	6282	21363
Myanmar	1638	12358
Philippines	706	5065
Singapore	214	10352
Thailand	12492	973104
Viet Nam	12800	445048

Source: WHO & UN-ESCAP websites & country data.

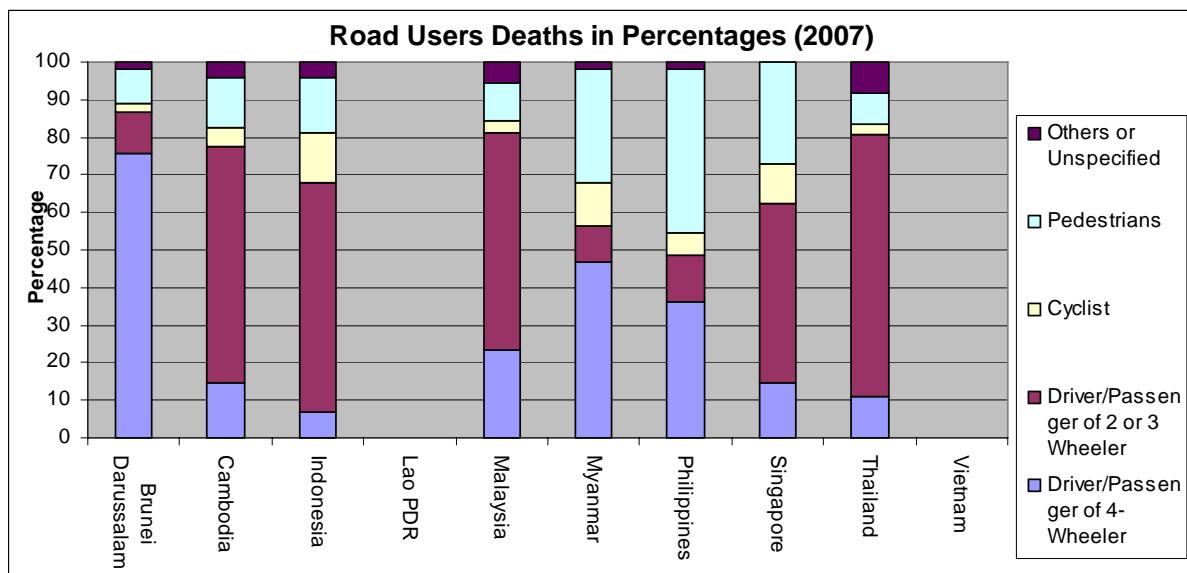
**Figure 3-2-14 Number of Fatalities in 2007 in AMSS**

On analyzing further the road user's death statistics, it reveals that a significant percentage of cyclist and pedestrian's are the victims of road accidents. It is surprising to note that despite dedicated efforts towards road safety in Singapore, of the total road user's death in 2007, approximately 27.1% and 10.3% victims were pedestrians and cyclist respectively. A high percentage of pedestrians were also victims of road accidents in the Philippines (43.6%), Myanmar (30.3%), Indonesia (15%) and Cambodia (13.3%). (Refer Table 3-2-16 and Figure 3-2-15). In Viet Nam in 2008, approximately 12,800 cases of traffic accidents occurred, killing 11,600 persons and injuring 8,100 persons. However, these numbers were less as compared to 2007 data. Hence, its number of traffic accidents went down by 12.5%, number of fatalities down by 11.9% and injuries down by 23.6%.

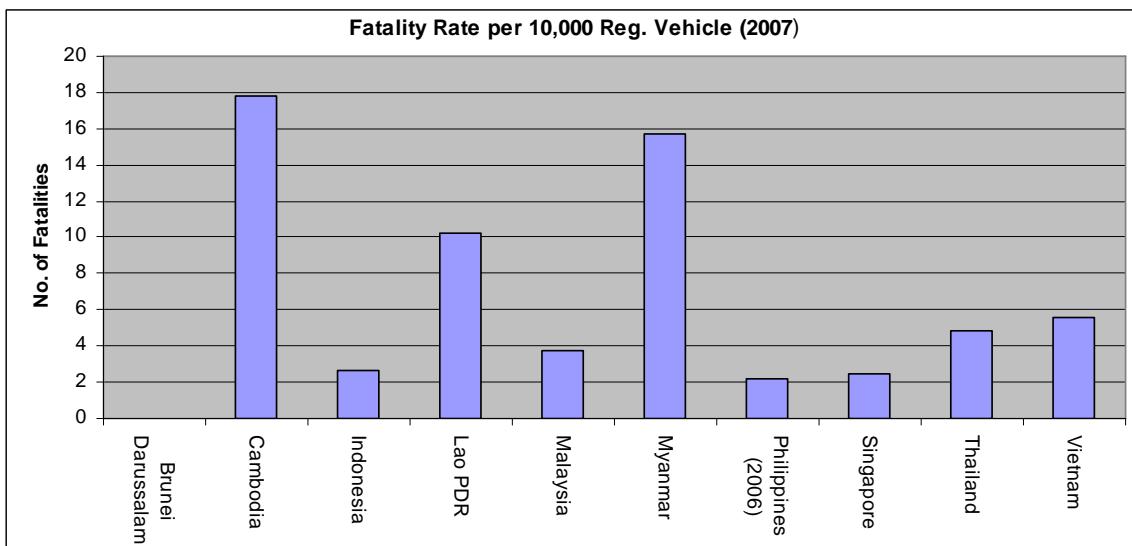
Table 3-2-16 Percentage of Road User Deaths (2007)

Country	Driver/Passenger of 4-Wheeler	Driver/Passenger of 2 or 3 Wheeler	Cyclist	Pedestrians	Others or Unspecified
Brunei Darussalam	75.8	11.1	1.9	9.2	2.1
Cambodia	14.9	62.8	4.7	13.3	4.2
Indonesia	7	61	13	15	4
Lao PDR	-	-	-	-	-
Malaysia	23.3	58	3	10.1	5.6
Myanmar	46.7	9.6	11.5	30.3	1.9
Philippines	36.4	12.3	5.7	43.6	2.0
Singapore	14.9	47.7	10.3	27.1	-
Thailand	11	69.7	2.8	8.3	8.2
Viet Nam	-	-	-	-	-

Source: WHO & UNESCAP websites & Country Data

**Figure 3-2-15 Percentage of Road Users Deaths (2007)**

On comparing the fatality rate per 10,000 registered vehicles in 2007, it reveals that Cambodia, Lao PDR, Myanmar, Viet Nam (CLMV) nations are suffering the most from lack of traffic safety culture. The analysis states that Cambodia has a maximum fatality rate of 17.8 per 10,000 registered vehicles, followed by Myanmar (15.67), Lao PDR (10.23) and Viet Nam (5.58). (Figure 3-2-16).

**Figure 3-2-16 Fatality Rate per 10,000 Registered Vehicles (2007)**

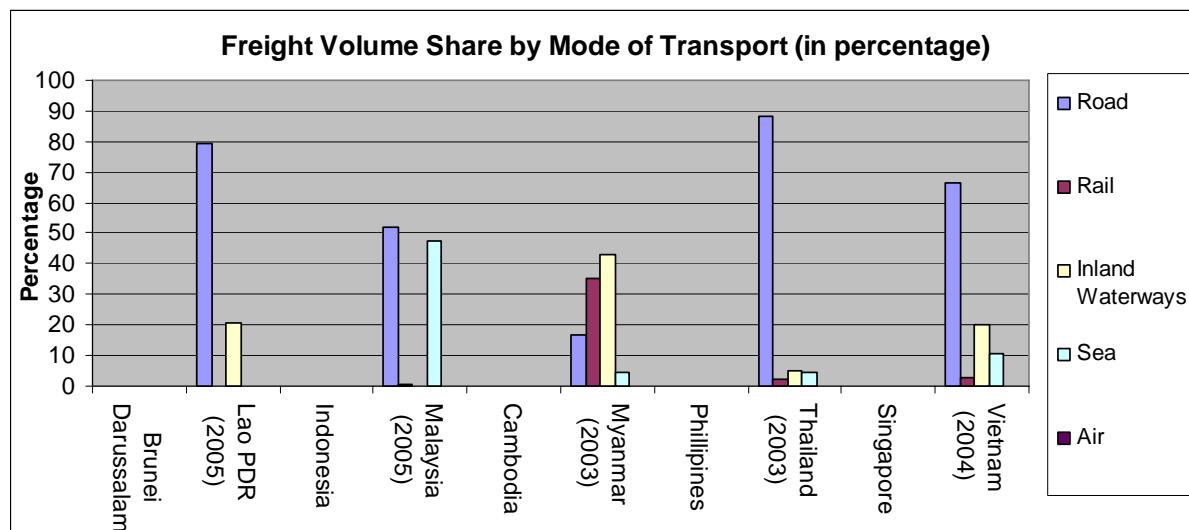
The above analysis and description reveals that there has been lack of attention and commitment to road safety by decision makers, often leading to insufficient road safety management and poor leadership. Most nations in the ASEAN region also suffer from the low level of road safety knowledge and awareness, unsafe vehicles and road conditions, inadequate legislation and enforcement. These all contributed to the poor road safety performance.

Land Transport and Road Safety Issues:

1. Lack of coordination and cooperation among the concerned stakeholders for the implementation of ASEAN highways, harmonization of the traffic signages and safe cross border movements of tourists and buses.
2. The need to promote green and environmentally-friendly technologies to combat rising pollution levels and climate changes. Specific pilot programmes should be initiated in cooperation with major international organizations and ASEAN.
3. There is a need to strengthen and enhance the existing weak institutional system in the AMSs especially in Lao PDR, Cambodia and Myanmar.
4. There is a need for capacity enhancement by provision of training and human resource development.
5. Enforcement of road safety norms and plan is required to reduce the high occurrence of accidents in AMSs. Specific efforts will be required to improve or upgrade the traffic safety facilities.
6. From road safety perspective, Programmes focusing on education and awareness need to be formulated and implemented.
7. To meet the targets as set for completion of the ASEAN highway by 2020, it is necessary to expedite the implementation activities. Specific efforts will be required in Lao PDR, Myanmar and Cambodia where Class-I roads are minimal or does not exist, as these countries mainly consist of Class-III roads or are below standards.
8. There is a need is to improve an efficient, comfortable and economical public transportation system to decongest traffic which are currently dominated by 2 wheelers and 3-wheelers in majority of ASEAN cities.
9. Highway and roads need to be connected to sea ports, inland ports, airport and railways.
10. Public Private Partnership (PPP) or private investment need to be promoted (through related norms/rules/laws) to overcome financial constraints for the improvement and implementation of Programme/projects in the road sector.

3.2.7 MODAL SHARE

The efficiency of the transport can be judged by its share with other modes of transport. The Figure 3-2-17 compares the freight volume share by different modes of transport in selected AMSs. The figure clearly highlights the dominance of road transport in trade. In Viet Nam, Thailand and Lao PDR, the share of road transport sector is more than 65%. In Myanmar, the inland waterways share is higher than the road. This may be due to large navigable river length and existence of poor quality of roads in Myanmar. The railway share except Myanmar is negligible in AMSs. Considering such trend, it is likely that the road share will likely go higher in the forthcoming years. Thus to facilitate such trend, it is vital to improve the quality of roads and other road infrastructure.



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-17 Transport Modal Share by Freight Volume in selected AMSs

3.2.8 RAIL NETWORK INVENTORY

Rail network is also an important indicator of a country's development, similar to road network lengths (and the extent to which the network is paved). However in the past, majority of AMSs do not give much emphasis to railway promotion and development.

Table 3-2-17 illustrates the trends of railway freight tonnage (net tons) over the period 1997–2007 in selected nations in the ASEAN region. Apart from Viet Nam (with an average annual growth rate of 7% per annum), the countries presented below recorded a negative growth rate. Malaysia and Indonesia recorded a negative average annual growth rate of -4.1 and -0.6 percent, respectively.

Table 3-2-17 Trend in Railway Freight Tonnage in the ESCAP Region, 1997–2007

Country	Rail Freight Tonnage (in millions)		Average Annual Growth Rate (%)
	Start of Period	End of Period	
Cambodia (1997-2007)	0.2	0.1	-6.7
Indonesia (1998-2005)	18.2	17.4	-0.6
Malaysia (1997-2006)	7.3	5	-4.1
Viet Nam (1998-2007)	4.9	9	7

Source: Review of Developments in Transport in Asia and the Pacific 2009

Same trend can be observed on the analysis and comparison of ton-km among AMSs. Except for Viet Nam, none of the said nations (as per available data) were able to improve their ton-km. Since 2000, Viet Nam was able to increase its ton-km by more than double, i.e. from 1,995 million tons in 2000 to 4,028 million tons in 2008. More than 20% decline in freight-km was observed in Thailand. (Table 3-2-18 and Figure 3-2-18).

Considering such trend, there is an urgent need to revive the railway sector in AMSs. Respective governments along with major investments also need to formulate effective policies to improve the railway performance in their nations.

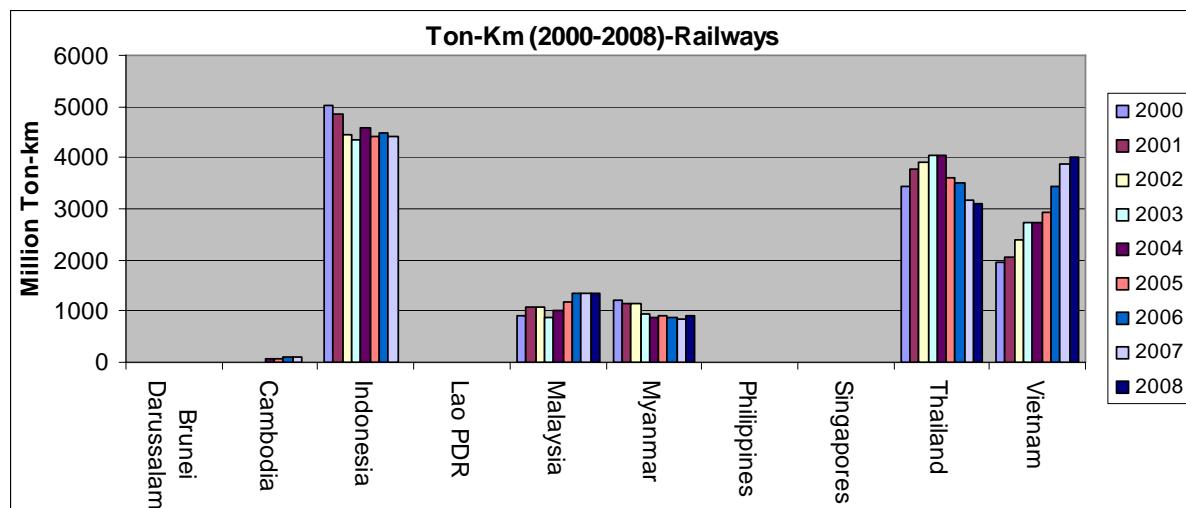


Figure 3-2-18 Railway Ton-km in AMSS

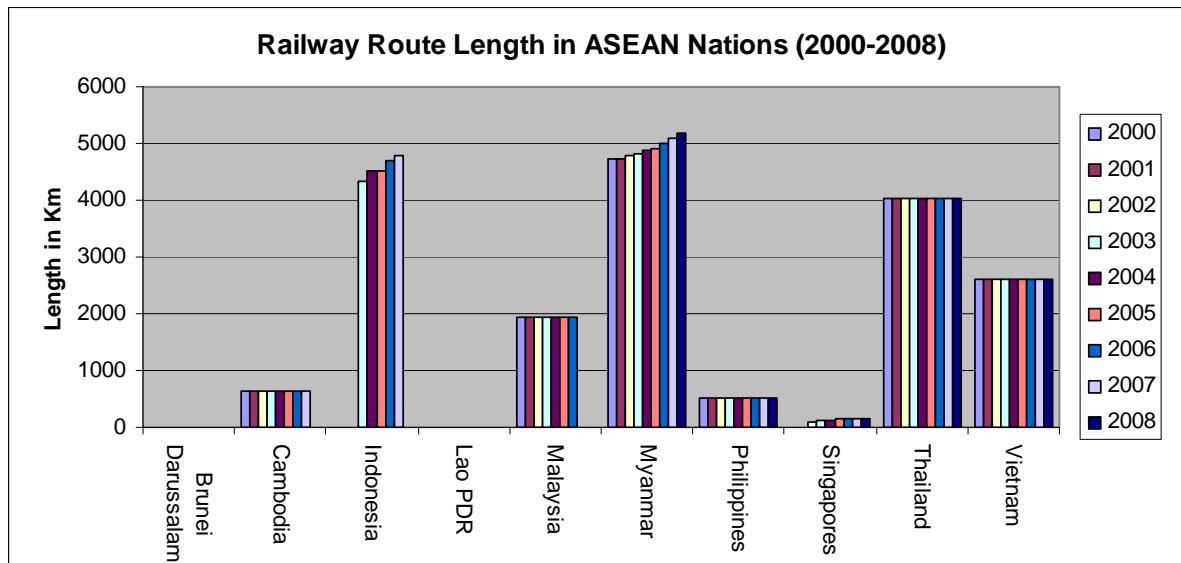
Table 3-2-18 Ton-km (million-ton) in AMSS

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	NE	NA	5,009	NE	918	1,200	4.37	NE	3,429	1,955
2001	NE	NA	4,859	NE	1,094	1,152	6.01	NE	3,775	2,054
2002	NE	NA	4,450	NE	1,073	1,156	6.52	NE	3,894	2,392
2003	NE	NA	4,356	NE	887	959	5.69	NE	4,057	2,725
2004	NE	77	4,580	NE	1,016	871	4.32	NE	4,037	2,745
2005	NE	80	4,432	NE	1,178	912	1.89	NE	3,621	2,949
2006	NE	93	4,474	NE	1,337	882	NA	NE	3,508	3,447
2007	NE	89	4,425	NE	1,356	857	NA	NE	3,160	3,883
2008	NE	NA	NA	NE	1,351	912	NA	NE	3,112	4,028

Source: ASEAN Statistical Yearbook, 2008 & Country Data NA- Not Available NE – Non Existence

The development or increase of railway route lengths is another indicator to assess the progress made in railways in ASEAN regions. On analyzing the rail route length in each member country as shown in Table 3-2-19 and Figure 3-2-19, it reveals that since 2000, there has been hardly any significant addition to railway route lengths. As observed in Cambodia, Viet Nam, Malaysia and Thailand, not a single kilometre of additional rail length has been added since 2000. In other AMSSs as well, additional lengths were almost negligible. Such lack of progress and investment in railways resulted in loss of railway freight tonnage among ASEAN countries, except in Viet Nam. Said country (Viet Nam) is the only nation that has been successful in increasing its freight tonnage by effective utilization of the available resources and railway length.

In terms of total rail length, Myanmar, Indonesia and Thailand are the leading nations followed by Viet Nam, Malaysia, and others.

**Figure 3-2-19 Railway Route Length in AMSs****Table 3-2-19 Railway Route Length (km) in AMSs**

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	NE	650	NA	NE	1,949	4,713	505.95	NA	4,044	2,600
2001	NE	650	NA	NE	1,949	4,725	505.95	NA	4,044	2,600
2002	NE	650	NA	NE	1,949	4,782	505.95	97	4,044	2,600
2003	NE	650	4,343	NE	1,949	4,820	505.95	128	4,044	2,600
2004	NE	650	4,517	NE	1,949	4,868	519.75	128	4,035	2,600
2005	NE	650	4,517	NE	1,949	4,920	519.75	138	4,035	2,600
2006	NE	650	4,682	NE	1,949	4,990	519.75	138	4,044	2,600
2007	NE	650	4,803	NE	NA	5,099	519.75	138	4,043	2,600
2008	NE	NA	NA	NE	NA	5,181	519.75	138	4,043	2,600

Source: ASEAN Statistical Yearbook, 2008 & Country Data NA - Not Available NE – Non Existence of Railways

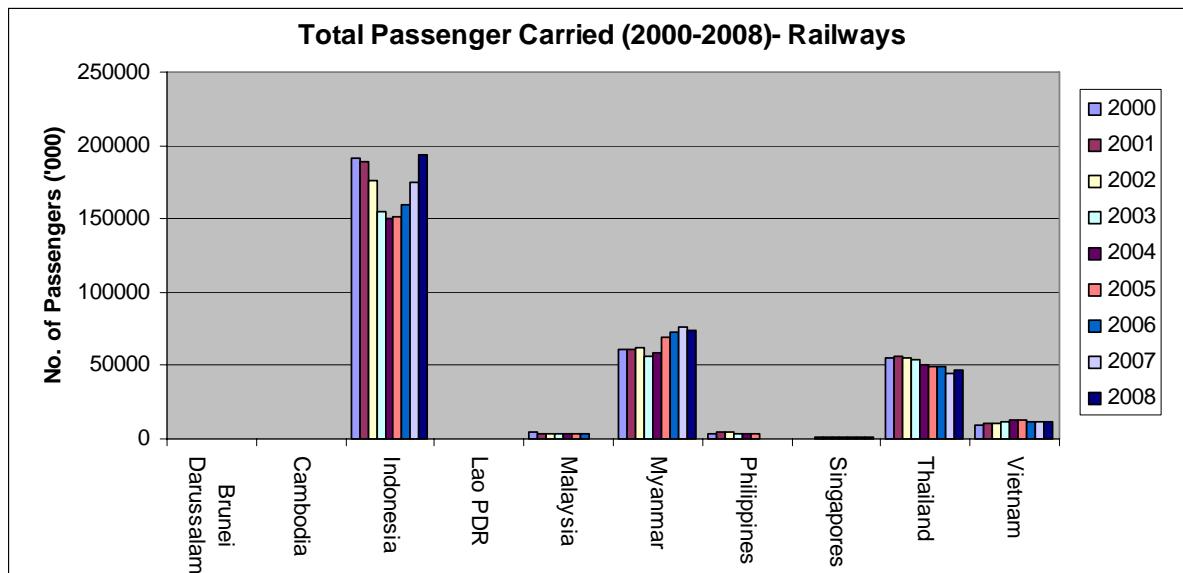
On comparing and analyzing the passengers carried by railways in AMSs then since 2000, not much significant differences were observed in the number of passengers carried, except in Singapore. It will be relevant to analyze and compare with the population growth in each respective nation. Despite the significant population growth since 2000 as shown in Table 3-2-21, the railways failed to increase its passenger volume capacities. The impact of population growth on railways passenger can be seen in Singapore where approximately 20.4% population increased between 2000 and 2008. During the same period, the railway passengers increased by approximately 50% i.e. from 1.1 million passengers in 2002 to 1.6 million passengers in 2008.

In terms of total annual passengers carried, Indonesia with an annual figure of approximately 194.1 million in 2008 carried the maximum number of passengers by railways. This is followed by Myanmar (73.56 million in 2008), Thailand (45.1 million in 2007), Viet Nam (11.3 million in 2008) and others. (Refer Table 3-2-20, Table 3-2-21, and Figure 3-2-20).

Table 3-2-20 Passenger Carried in AMSs (in Thousands)

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	NE	336	191,600	NE	4,340	60,490	3,878	NA	55,461	9,806
2001	NE	223	188,400	NE	3,985	61,280	5,106	NA	56,325	10,627
2002	NE	133	175,716	NE	3,863	61,760	4,357	1,120	55,748	10,800
2003	NE	93	154,700	NE	3,701	56,670	3,900	1,164	54,130	11,600
2004	NE	81	149,918	NE	3,993	58,220	3,904	1,235	50,873	12,900
2005	NE	48	151,492	NE	4,024	69,270	3,309	1,293	49,671	12,800
2006	NE	14	159,419	NE	4,084	72,710	NA	1,372	48,867	11,600
2007	NE	11	175,336	NE	NA	75,960	NA	1,475	45,050	11,600
2008	NE	NA	194,076	NE	NA	73,560	NA	1,635	46,600	11,300

Source: ASEAN Statistical Yearbook, 2008 & country data NA- Not Available NE – Non Existence of Railways

**Figure 3-2-20 Total Passenger Carried by Railway in AMSs****Table 3-2-21 Mid Year Population of AMSs, 1980-2008
(National Estimates, in thousand)**

Country	1980	1990	2000	2005	2006	2007	2008
Brunei Darussalam	196	253	333	370	383	390	397
Cambodia	6,590	8,600	12,760	13,807	14,081	14,364	14,656
Indonesia	146,777	179,248	205,280	219,852	222,747	225,642	228,523
Lao PDR	3,199	3,676	5,403	5,310	5,457	5,608	5,763
Malaysia	13,879	18,102	23,274	26,128	26,640	27,245	27,863
Myanmar	33,608	40,786	46,610	55,396	56,515	57,504	58,510
Philippines	48,098	60,703	77,689	85,261	86,973	88,575	90,457
Singapore	2,414	3,047	4,018	4,266	4,401	4,589	4,839
Thailand	46,718	55,839	62,347	65,099	65,574	66,041	66,482
Viet Nam	52,462*	66,017	78,663	83,106	84,137	85,155	86,160

Source: ASEAN Statistical Yearbook, 2008 and UN website (for 2000 data), *1979 figure

It is observed that the passenger-km among AMSs is not different from the situation of railway route length or number of passengers carried as discussed earlier. In terms of passenger-km since 2000, except for Viet Nam, Myanmar and Philippines, there had not been any significant increase observed in any other AMSs. Indeed, on comparing with the 2000 data a declining trend was observed in Cambodia, Indonesia and Thailand. Viet Nam and Philippines are the only two nations that had been successful in increasing the passenger-km by more than twice since 2000. (Table 3-2-22 and Figure 3-2-21).

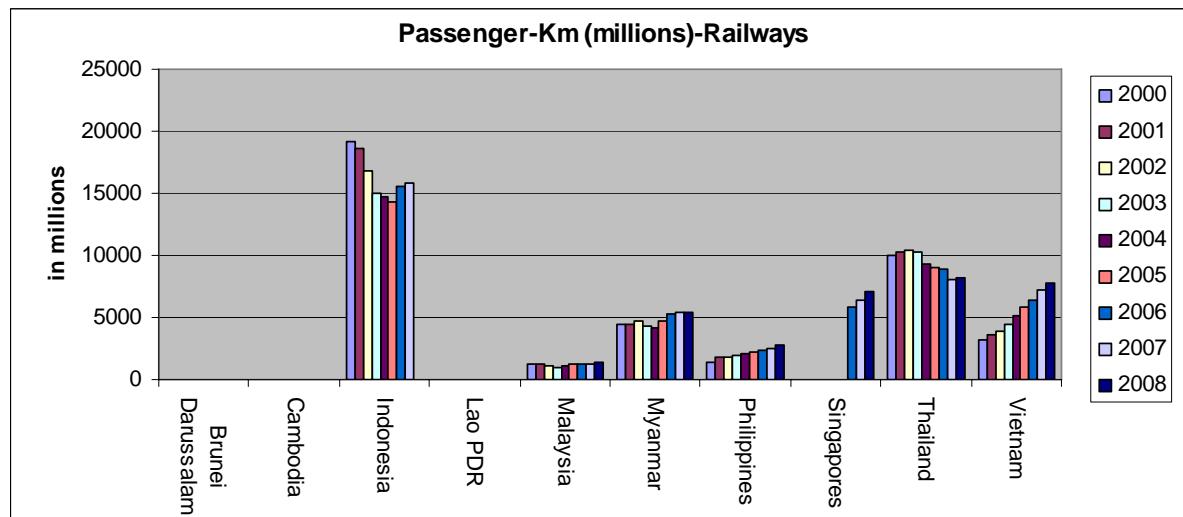


Figure 3-2-21 Railways Passenger-km in AMSs

Table 3-2-22 Passenger-km (million) in AMSs

Year	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
2000	NE	45	19,228	NE	1,241	4,421	1,325	NA	9,935	3,247
2001	NE	NA	18,628	NE	1,199	4,477	1,797	NA	10,321	3,562
2002	NE	NA	16,829	NE	1,138	4,682	1,852	NA	10,378	3,935
2003	NE	NA	15,031	NE	1,031	4,286	1,944	NA	10,251	4,438
2004	NE	9	14,777	NE	1,152	4,166	2,047	NA	9,332	5,117
2005	NE	5	14,345	NE	1,195	4,750	2,240	NA	9,052	5,770
2006	NE	1	15,579	NE	1,248	5,275	2,396	5,898	8,824	6,391
2007	NE	1	15,872	NE	1,317	5,405	2,515	6,322	8,038	7,186
2008	NE	NA	NA	NE	1,386	5,358	2,749	7,039	8,217	7,736

Source: ASEAN Statistical Yearbook, 2008 & Country Data NA- Not Available NE – Non Existence of Railways

3.2.9 RAILWAY NETWORK AND CROSS BORDER RAILWAY LINKAGES

On reviewing the current railway network in ASEAN countries, it was found that there are many missing links in respective nations. Currently, the railway network in each nation is disintegrated and will require huge investment and resources to have an improved, efficient, effective and integrated railway system (Refer Figure 3-2-22, Figure 3-2-23, Figure 3-2-24 and Figure 3-2-25).

In comparison to the cross-border linkages by highways, the railways do not have many linkages among ASEAN countries. If the proposed network under Singapore-Kunming Rail Network (SKRL) project (to be discussed in the next section) is not implemented, only four

AMSSs (Singapore, Malaysia, Lao PDR and Thailand) share cross-border railway linkages. Currently, railway links exist between the following nations:

1. Singapore and Malaysia
2. Malaysia and Thailand.
3. Thailand and Lao PDR

However, considering the ongoing SKRL project, the numbers of cross border railway linkages will be increased from the current four nations (Singapore, Malaysia, Lao PDR and Thailand) to seven nations (Singapore, Malaysia, Thailand, Cambodia, Lao PDR, Viet Nam and Myanmar). Table 3-2-23 presents the cross border linkages before and after the SKRL. Overall, the following cross-border linkages will be established after the implementation of SKRL project:

1. Singapore and Malaysia
2. Malaysia and Thailand.
3. Cambodia and Thailand
4. Cambodia and Viet Nam
5. Lao PDR and Thailand
6. Lao PDR and Viet Nam
7. Myanmar and Thailand

With the establishment of such railway linkages, trade and economic activities among AMSSs will be facilitated. Such railway linkages will be of vital importance especially to the landlocked nation like Lao PDR. After the completion of SKRL project, Lao PDR will have a direct linkage to the ports in Viet Nam.

Table 3-2-23 Cross Border Railway Linkages Before and After SKRL

Country	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Brunei Darussalam										
Cambodia								✓(1)*	✓(1)*	
Indonesia										
Lao PDR								✓(1)	✓(1)*	
Malaysia							✓(1)	✓(2)		
Myanmar								✓(1)*		
Philippines										
Singapore					✓(1)					
Thailand		✓(1)*		✓(1)	✓(2)	✓(1)*				
Viet Nam		✓(1)*		✓(1)*						

Source: ERIA Study Team

Note- The number in the parenthesis indicates the number of physical railway link between the two nations.

* means the railway linkages after the completion of SKRL project.

✓ means that there is physical rail links between the two countries.

Blank boxes means either non-existence (or not applicable) of physical rail links between the two nations.



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-22 Railway Network in all AMSS

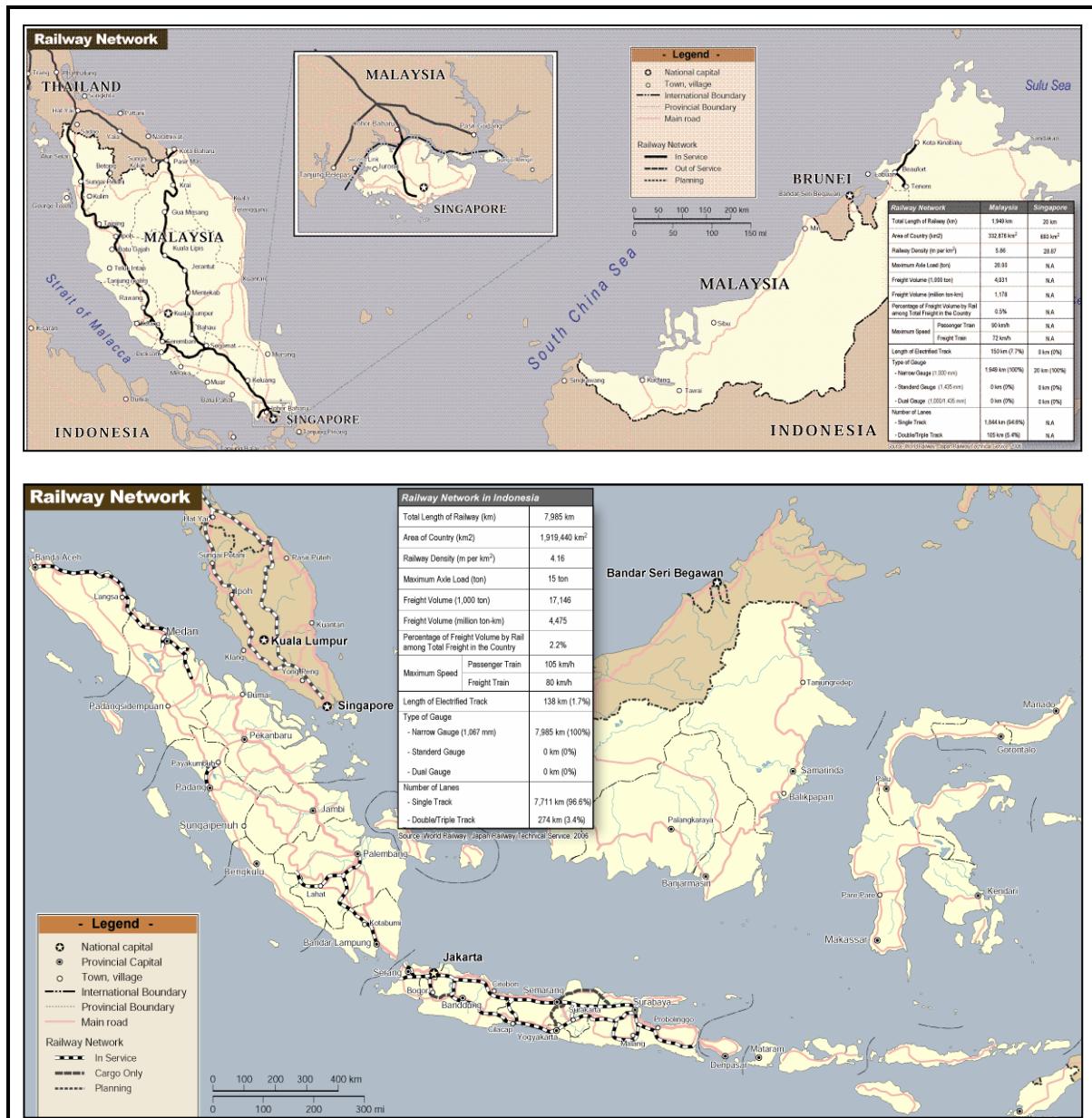
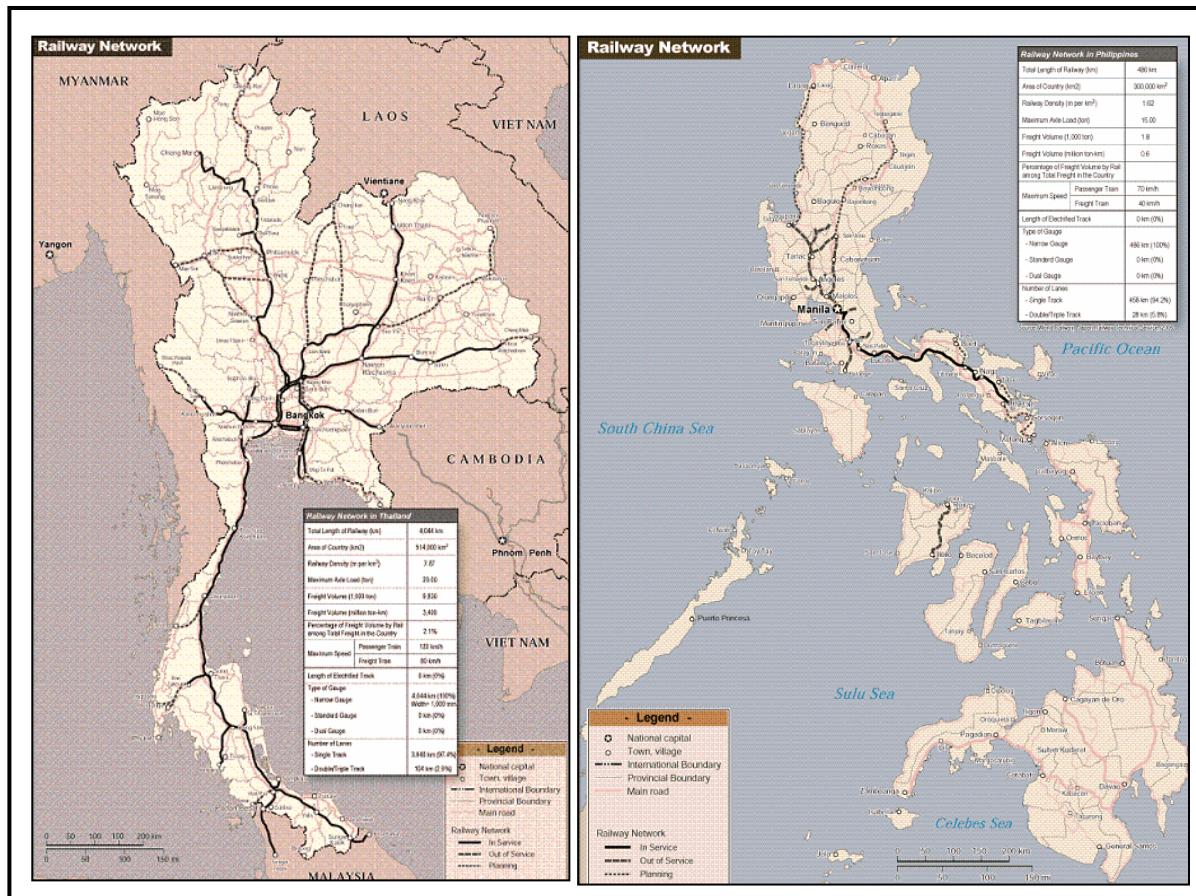


Figure 3-2-23 Railway Network in AMSs (1 of 3)



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-24 Railway Network in AMSs (2 of 3)



Source: ASEAN Logistics Network Map Study, JETRO, 2009

Figure 3-2-25 Railway Network in AMSs (3 of 3)

3.2.10 SINGAPORE-KUNMING RAIL LINK (SKRL)

The SKRL project was proposed at the Fifth ASEAN Summit in December 1995. It is a flagship project of the ASEAN-Mekong Basin Development Cooperation (AMBDC).

The SKRL feasibility study examining six alternative routes to link Singapore to Kunming, China was completed in August 1999. The study covered the technical, economic and financial feasibility of the routes, environmental impact, prioritized routes based on set criteria, financing options, and the appropriate implementation schedule. All six routes have a common sector from Singapore to Bangkok via Kuala Lumpur. The details of the six routes are briefly presented in Table 3-2-24 below:

Table 3-2-24 Routes Alternatives for SKRL Project

Route	Countries Involved	Direct Route (km)	New Construction	
			Main Route	Spur Line
1	Cambodia, Lao PDR, Viet Nam.	5382	431	585
2	Thailand, Myanmar and China	4559	1127	-
3	Lao PDR, China	4259	531	66
4	Lao PDR, China	4164	1300	-
5	Lao PDR, Viet Nam, Thailand	4481	616	-
6	Lao PDR, Viet Nam, Thailand	4255	589	-

Source: Feasibility Study for the SKRL.

Route 1, for its high social and economic impact which connects Cambodia, Lao PDR, Viet Nam and China, was selected. The part of the Route 2 that would integrate Myanmar into the regional rail network was also added to the SKRL route network. With this, the overall route configuration now covers seven AMSs and China. The SKRL route tried to utilize the existing railway network in the respective nations. However, to have a complete network, certain missing sections need to be constructed. The SKRL routes consist of the following missing links and spur lines (refer to Figure 3-2-26) for new construction:

1. From Poipet (Cambodia) to Sisophon (Cambodia)
2. From Phnom Penh (Cambodia) to Loc Ninh border (Cambodia & Viet Nam) to Ho Chi Minh City (Viet Nam)
3. From Namtok (Thailand) to Three Pagodas Pass (Thailand & Myanmar border) to Tanbyuzayat (Myanmar)

Spur Line:

1. Vientiane (Lao PDR) to Thakhek (Lao PDR) to Mu Gia (Lao PDR and Viet Nam border) to Vung Ang (Viet Nam).

Table 3-2-25 provides a description of existing and new requirements for the railway construction in the missing sector/routes and spur lines in SKRL network. To accomplish the SKRL network, new railway construction will be required in the CLMV (Cambodia, Lao PDR Myanmar Viet Nam) countries and Thailand. Considering capacity and resource constraints, especially in CLMV nations, special efforts and assistance will be required from the other AMSs, dialogue partners and other international organizations to accomplish the tasks. It is to be noted that the maximum length of new construction is required in the least developing nation, Lao PDR, to accomplish the spur line.

Table 3-2-25 New Construction Requirements in Missing Routes and Spur Line

Country	Missing Sector/Route and Spur Line	Existing (km)	New Construction (km)
Cambodia	Poipet (Thailand border) -Sisophon	-	48
Cambodia	Phnom Penh -Loc Ninh (Viet Nam border)	32	255
Viet Nam	Loc Ninh (border) - Ho Chi Minh City	20	129
Myanmar	Thanbyuzayat - Three Pagoda Pass	-	111
Thailand	Three Pagoda Pass - Nam Tok	-	153
Lao PDR	Vientiane-Thakhek-Mu Gia	-	466
Viet Nam	Mu Gia - Tan Ap- Vung Ang	6	119

Source: Feasibility Study for the SKRL and country data.

The current status of the SKRL project is summarized in Table 3-2-26.

Table 3-2-26 Current Status of Singapore-Kunming Rail Link Network (SKRL) Project

Country	Missing Sections/Route & Spur Lines	Rail Length (km)		Pre-Feasibility (Pre-FS) or Feasibility Study (FS) Status	Implementation Status	Planned Year for Implementation
		Existing Length of section	New Construction			
Cambodia	Poipet (Thailand border) - Sisophon	-	48	Completed	Ongoing	2013
Cambodia	Phnom Penh -Loc Ninh (Viet Nam border)	32	255	Ongoing	Not Commenced	2015
Viet Nam	Loc Ninh (Cambodia border) - Ho Chi Minh City	20	129	FS Completed	Not Commenced	2020
Myanmar	Thanbyuzayat - Three Pagoda Pass (Thailand Border)	-	111	FS Completed	Not Commenced	2020
Thailand	Three Pagoda Pass (Myanmar border) - Nam Tok	-	153	FS Completed	Not Commenced	2020
Lao PDR	Vientiane-Thakhek*	-	330	FS Completed	Not Commenced	2020
Lao PDR	Thakhek-Mu Gia (Viet Nam border)*	-	136	FS Completed	Not Commenced	2020
Viet Nam	Mu Gia (Lao PDR border) - Tan Ap*	-	53	Pre-FS Completed	Not Commenced	2020
Viet Nam	Tan Ap- Vung Ang*	6	66	FS Ongoing	Not Commenced	2020

*Spur Line FS - Feasibility Study Pre-FS – Pre Feasibility Study NA – Not Available

Source: ERIA Study Team (in consultation with SKRL Feasibility Study and various meetings (LTWG, EG, STOM etc) details)



Source: ASEAN website (SKRL Fact Sheet)

Figure 3-2-26 Singapore Kunming Rail Link (SKRL) Route Network

3.2.11 INLAND WATERWAY TRANSPORT (IWT)

The ASEAN region is generously endowed with some 51,000 km navigable inland waterways and plays an active role in transport development, especially in Viet Nam, Cambodia, Lao PDR, Myanmar and Thailand. Some are canals and single rivers, while others form parts of major deltas. The Lancang-Mekong River is famous in the world for its enormous contribution to the national and regional development. Others, including the Thanlwin River in Myanmar, the Chao Phraya River in Thailand and the Red River in Viet Nam, are less famous but equally important for their contribution to national economies and people's daily lives. Table 3-2-27 shows the navigable lengths in each AMSS.

Table 3-2-27 IWT Navigable Length (km) in AMSs

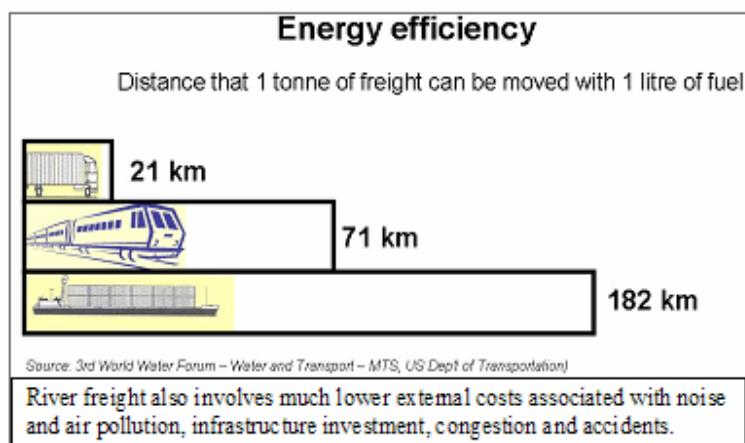
Country	Navigable Length (km)
Brunei Darussalam	NA
Cambodia	1,750
Indonesia	20,456
Lao PDR	4,600
Malaysia	3,300
Myanmar	6,650
Philippines	1,033
Singapore	NA
Thailand	1,750
Viet Nam	11,400

Source: UNESCAP 1998/2001, ASEAN Transport and Communications Sectoral Report, 1999

NA- Not Available

The region's inland waterways play a vital role in the economic development of remote rural areas and in the welfare of their inhabitants who are usually among the lowest of the low-income groups in the region. For example, more than 60 million people live in the lower part of the Mekong Basin. Close to one third of the basin's population lives on less than one dollar per day and many of them depend wholly or partially on the basin's natural resources for their livelihood. In the absence of river and other forms of inland waterway transport, many remote underprivileged communities would be inaccessible or too costly to be provided with other means of service.

Despite the inland waterways' cost-effectiveness, relative fuel efficiency (refer to Figure 3-2-27), environment friendliness and importance for the mobility, welfare and development of remote communities in several countries of the region, inland waterways have suffered from lack of adequate investment and efforts for many years.



Source: Mekong River Commission Website

Figure 3-2-27 Inland Waterways Transport (IWT) Efficiency over Road and Rail Transport

The inland waterways' share of freight and passenger volume in comparison to road transport is quite low. In general, the following may be the reasons for the under utilization of existing IWT:

1. Undeveloped network. Currently, IWT mainly serves short-distance traffic.
2. Channels' obstructions (waterway maintenance, sedimentation, rapids, bank protection, low depth etc.)

3. Poor river port and related facilities. Lack of storage facilities and limited spaces for ports.
4. Poor intermodal connectivity to inland waterways. Results were found good in the fairly dense transport networks area where connectivity is good such as in Central Thailand, Bangkok etc
5. Lack of transport promotion strategy.
6. Operational and administrative shortcomings.
7. Lack of understanding of common navigation rules, safety and security standards. Poor signages and landmarks to aid navigation.
8. Lack of training, capacity building, socialization and awareness Programmes.
9. Inefficient custom and immigration procedures
10. Weak institutional arrangement for the promotion and management of IWT.
11. Insufficient number of workshops for ship building and maintenance.

Considering the advantages of inland waterways and its regional significance, there is a need to develop, promote and integrate it into the development of the ASEAN transportation network, particularly with respect to its intermodal transport linkages.

3.2.12 INLAND WATERWAY TRANSPORT IN THE SELECTED AMSS

The following section will briefly describe the IWT in selected nations.

(1) Cambodia

The inland waterway system of Cambodia has a total navigable length of 1,750 km, of which only 580 km are navigable all year round. The system consists of the Mekong River and its tributaries, Tonle Sap Lake and its tributaries, the Tonle Sap River, and the Bassac River. The Mekong River accounts for about 30% of the length of navigable inland waterways. Meanwhile, Tonle Sap River, Bassac River and the remaining waterways account for 15%, 5% and 50%, respectively. There are two international river ports in Cambodia which are both located on the Tonle Sap River in Phnom Penh. One is a conventional port comprising two berths and the second is a floating port.

Phnom Penh is some 100 km from the Viet Nam border by river. However, the bends of the river prevents the passage of vessels of more than 110 m long. Boats up to 150 tons capacity can be used to reach as far as Kratie. Larger boats can be used at high waters. Between Kratie and Stung Treng, 50-ton boats can pass without difficulty during rainy season. At low water levels however, the rocky conditions will only be passable to smaller vessels of up to 20 ton. Above Stung Treng to Veunkham just across the Lao border, only small boats of some 10-15 tons at low water and perhaps 50 tons at high water can pass through.

(2) Indonesia

There are more than 20,000 km of navigable waterways among 50 river systems in Indonesia. Over half of these rivers are in Kalimantan and the rest are in Sumatra. In Kalimantan and Sumatra, the river system provides a lifeline to communities, which are poorly served by roads (and by railways in the case of Sumatra). Inland waterways are already an important conduit for the movement of coal mines in the interior of Kalimantan to ports on its coast. The country's inland waterway system currently carries about 6 to 7 million tons of freight and 16 million passengers annually. Most of the vessels and terminals on the inland waterways system are owned and operated by the private sector.

In the past, some infrastructure improvements have been carried out, like the construction of new wharves, dredging of river channels at several river ports, and installation of navigational aids. However, because of the high seasonal variation in the water level of many rivers, the role of inland waterways is relatively minor and limited to certain areas of Sumatra and Kalimantan, if no further investment for improvement of crucial sections is provided.

(3) Lao People's Democratic Republic

There are 21 river port facilities on the Lao PDR side of the Mekong River (refer to Figure 3-2-28). With the exception of one river port (Kaolia) which is operated privately, all facilities are under the responsibility of the provincial government.

The Mekong River and its tributaries, the Nam Ou and Se Kong rivers, flow through the country for over 2,000 km or approximately 40% of the total length pass through the territory of the Lao PDR. However, rapids, waterfalls, and low water levels during the dry season reduce the navigable length for river transportation to only 1,300 km. Vessels up to 400 dead weight tons (DWT) can operate year round on the northern section of the Mekong River, while elsewhere operations are limited to barges of 200 DWT or less. Vessels carry mainly industrial and agricultural products. The main commodities handled are sand, rock, wood products, food grains, steel products, and logs. The majority of the traffic is domestic, but international traffic is important on the upper section among China, Lao PDR, Myanmar and Thailand. In the dry season, most of the rivers are navigable only by small, shallow-draft, narrow-beam passenger vessels.

The two sections between the China border – Houeisai – Luang Prabang have many small rapids that serve as barriers to navigation in the dry season. The section between Luang Prabang and Vientiane is navigable throughout the year but also has difficult sections, even at high water levels. The most easily navigable section is from Vientiane – Thakhek – Savannakhet, where navigation could be improved at a relatively low cost, although there are still several dangerous areas.

The main barrier along the Mekong is the Khemarat rapids between Savannakhet and Pakse, which completely cause closure of the river to dry season transport and severely limit wet season navigability. In the Pakse – Don Deth section, navigation is easier only to as far as the Cambodian border, where the Khone Falls is an impassable obstacle. A 5-km rail line on Khong Island used to operate in colonial times to tranship goods between the top and bottom of the falls.

(4) Myanmar

The network of main navigable waterways in Myanmar comprises the following river systems: the Ayeyarwady, Chindwin, Sittoung, Kaladan, Leinmyo, Thanlwin, Gyaing and Ataran systems. These rivers, with their numerous tributaries, offer 6,650 km of commercially navigable waterways. There are approximately 400 river stations on the Ayeyarwady and Chindwin systems, of which 16 are larger ports, each with an annual cargo handling capacity of at least 40,000 tons.

Owing to the relatively poor coverage of road and rail, large areas along the Ayeyarwady and Chindwin valleys are accessible only by water. Hence IWT has the largest share of the cargo volume transported in Myanmar. It is estimated that nearly five million tons of cargo and 45.8 million passengers are transported by IWT annually.

(5) Thailand

There are about 4,000 km of inland waterways in Thailand. About 3,700 km has a navigable depth of about 0.9 meter or more in a year. Inland navigation is mainly concentrated in four river systems: the Chao Phraya, Pasak, Tha Chin and Mae Klong systems.

The IWT is estimated to transport about 20 million tons of cargo annually, which is quite low when compared with the share of roads. Construction materials (especially sand), agricultural products and petroleum are the dominant commodities carried by IWT in Thailand.

Outside of Bangkok, very few passengers are transported on inland waterways. In Bangkok, Chao Phraya River and Khlong Saen Saeb are the major means of water-transportation. Express boats, long-tail boats and river-crossing ferries transport more than 360,000 passengers per day.

(6) Viet Nam

Viet Nam has 41,000 km of natural waterways, of which more than 8,000 km are used commercially. Of these, the Viet Nam Inland Waterways Administration manages about 6,000 km as well as the main river ports. Local governments manage the balance of the commercial waterways. Roughly 63% (6,000 km) of the country's total length of navigable inland waterways is concentrated in the rivers and canals of the Mekong Delta. (Refer to Figure 3-2-29)

Despite limited investment, the waterways remain attractive for the transport of coal, rice, sand, stone, gravel, and other usually high-weight low-value goods. Moreover, livelihoods and personal transport depend heavily and successfully on waterway transport in the delta regions of the Mekong and Red River.

River boats and barges have rapidly developed. In 1999, there were 63,600 units with a capacity of 1.7 million dead weight tons (DWT) and 197,000 passenger seats. In 2003 this had increased to 83,000 boats with a capacity of 3.7 million dead weight tons (DWT) and 280,000 passenger seats. In addition there are tens of thousands of small "country" boats and ferry boats. Some major channels handle dense volumes of traffic, in terms of dead weight tons (DWT) per year. For example in the south, the Cho Gao/Hau Giang and the Tien Giang River systems handle approximately 21.6 and 15.8 million dead weight tons (DWT) per year respectively, while the north the Kinh Thay River system handles approximately 15.2 million dead weight tons (DWT) per year.

3.3 AIR TRANSPORT

The air transport sector in the ASEAN region, which has a vast transportation area, has become an important mode actively supporting with air active region flow. As people, money and information move in a rapid and wide range global scale, the role of the air transport sector has become significant with the development of the liberalisation of air transport sector, the recent growing Low Cost Carriers (LCCs) and other advancements.

Towards the establishment of the ASEAN Economic Community (AEC) scheduled on 2015, the air transport sector, through the proposed ASEAN Single Aviation Market (ASAM), support the AEC to address problems related to Open Sky Policy as its elements. It also intends to promote safety, security, environment, and privatization to support further development and solve related problems.

3.3.1 ASEAN AIRPORTS AND AIRLINES

Recently, due to the rapid increase of air traffic volume, the ASEAN capital airports were constructed / improved considering the future demand increase. The feature of member states' capital airport and airlines including LCCs are described below.

(1) Airports

The capital airports of AMSs are sufficient in terms of runway lengths to accommodate the existing operation of aircrafts including large aircrafts such as B-747 and A-380. However, some of these airports still face problems in providing airport facilities such as terminal building, parking apron and number of runways. Therefore, AMSs have recently implemented the improvement of airport facilities and services to meet the rapid increase in air traffic volume.

Particularly, due to the increasing operation of LCCs, Changi, Kuala Lumpur, and Soekarno Hatta airports have started the expansion of the terminal projects for LCCs, known as the "Low Cost Terminal."

In 2006, Survanabhumi (Bangkok) International Airport was newly opened. The airport has two parallel runways (60 m. wide, 4,000 m. and 3,700 m. long) to accommodate simultaneous flight departures and arrivals. Initially, the handling capacity was 45 million passengers and 3 million tons of cargo per year.

The current status of the development activities undergoing at the airports in the capital cities of AMS are shown in Table 3-3-1 below.

Table 3-3-1 Airport Development Activities Undergoing in the Capital City

Airport Name (City)	Runway (L x W, m)	Current Information of Development Plan
Bandar Seri Begawan	3,658 x 46	Development project for airport city, cargo village and airline hub.
Pochentong (Phnom Penh)	3,000 x 44	Ongoing for terminal building expansion project.
Soekarno Hatta/ (Jakarta)	3,660 x 60 3,600 x 60	Master plan study for Jakarta Metropolitan area airport
Vientiane	3,000 x 45	Preparation for air-side facility improvement project.
Kuala Lumpur	4,056 x 60 4,124 x 60	LCCs terminal project in Kuala Lumpur started in 2009 and will be completed in 2011.
Yangon	3,413 x 61	New international airport in Naypyidaw is ongoing for construction and completion on 2011.
Ninoy Aquino (Manila)	3,737 x 60 2,258 x 45	Master plan study for Manila Metropolitan area airport
Changi (Singapore)	4,000 x 60 4,000 x 60 2,748 x 59	Terminal 1 upgrading project is ongoing up to 2011.
Survanabhumi (Bangkok)	4,000 x 60 3,700 x 60	Preparation for the Phase 2 project/ midfield terminal and a third runway.
Noi Bai (Hanoi)	3,700 x 60	Preparation for Terminal 2 development project.

Source: AMSs' Web site

(2) Airline

The current list of regular airline flights and comparison between number of airlines in 1998 and 2010 in AMSs are shown below Table 3-3-2.

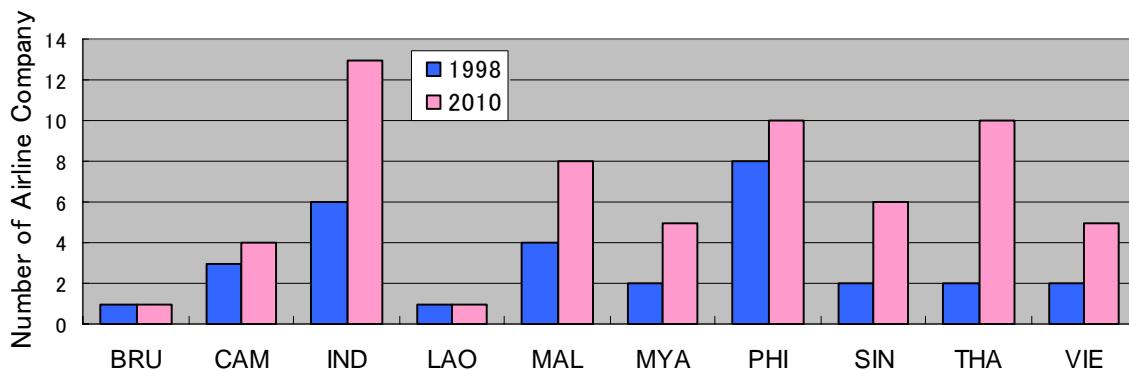
Table 3-3-2 AMSs Airlines in 2010

Country Name	No.	Airline Name
Brunei Darussalam	1	Royal Brunei Airlines
Cambodia	4	Cambodia Angkor Air, Royal Khmer Airlines, PMT air, Kampuchea Airlines
Indonesia	13	Garuda Indonesia, Batavia Air, Citilink, Indonesia AirAsia, Lion Air, Mandala Airlines, Merpati Nusantara, Riau Airlines, Sriwijaya Air Republic Express, Auvia Air, Cardig Air, Xpressair
Lao PDR	1	Lao Airlines
Malaysia	8	Malaysia Airlines, AirAsia, AirAsia X, Berjaya Air, Firefly, MA Awings Transmile Air Services, MASkargo
Myanmar	5	Myanma Airways, Air Bagan, Air Mandalay, Yangon Airways, Myanmar Airways International
Philippines	10	Philippine Airlines, Air Philippines, Cebu Pacific, Pacific Pearl Airways, South East Asian Airlines, Zest Airways Pacific East Asia Cargo Airlines, 2GO, Corporate Air, TransGlobal Airways,
Singapore	6	Singapore Airlines, SilkAir, Tiger Airways, Valuair, Jetstar Asia Airways Singapore Airlines Cargo, Jett8 Airlines
Thailand	10	Thai Airways, Air Phoenix, Nok Air, Orient Thai Airlines, SGA Airlines, SkyStar Airways, Thai AirAsia Air People International, Angel Airlines, K-Mile Air,
Viet Nam	5	Viet Nam Airlines, Indocina Airlines, JetStar Pacific Airlines Pacific Airlines, Viet Nam Air Services

Source: OAG Flight Guide, AMSs

Traditionally, the flag carrier of each country is responsible for their own air traffic. With the global spread of open sky policy, LCCs has started in operation of the ASEAN sky. For instance, AirAsia operates in Asia and has already established an airline company in capitals of few countries such as Indonesia, Malaysia, and Thailand.

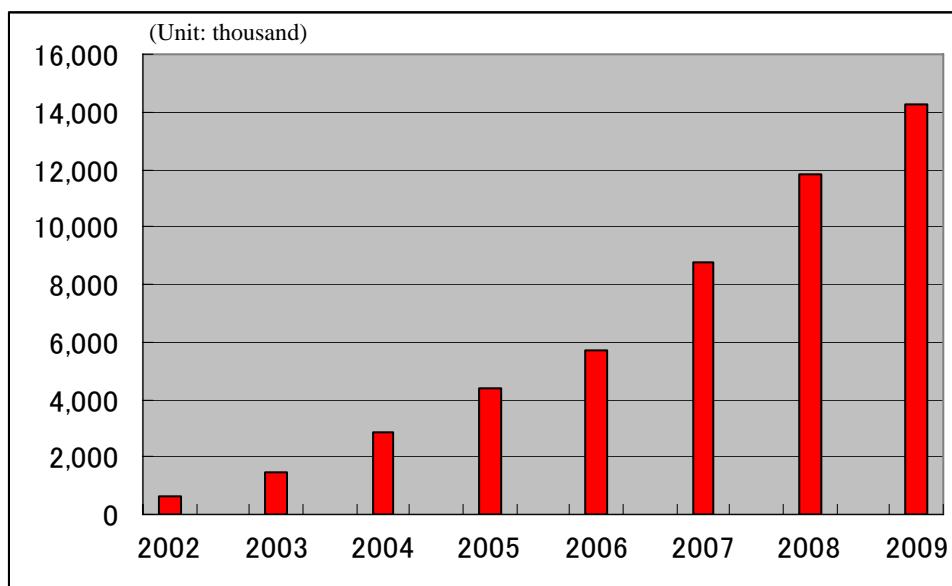
Since 1998, there has been a constant increase in the establishment of airline companies in ASEAN. The following figure shows the comparison of number of airline companies between 1998 and 2010. Based on this figure, most of AMSs except for the Philippines exhibit increase the operation of airlines.



Source: OAG Flight Guide Jan. 2010

Figure 3-3-1 Comparison for Number of Airlines 1998 and 2010 in AMSs

Figure 3-3-2 below shows the trend of air passenger volume of AirAsia group flights from 2002-2009. This indicates that the increase in ratio between 2002 and 2009 is significant with as much as 23.4 times.



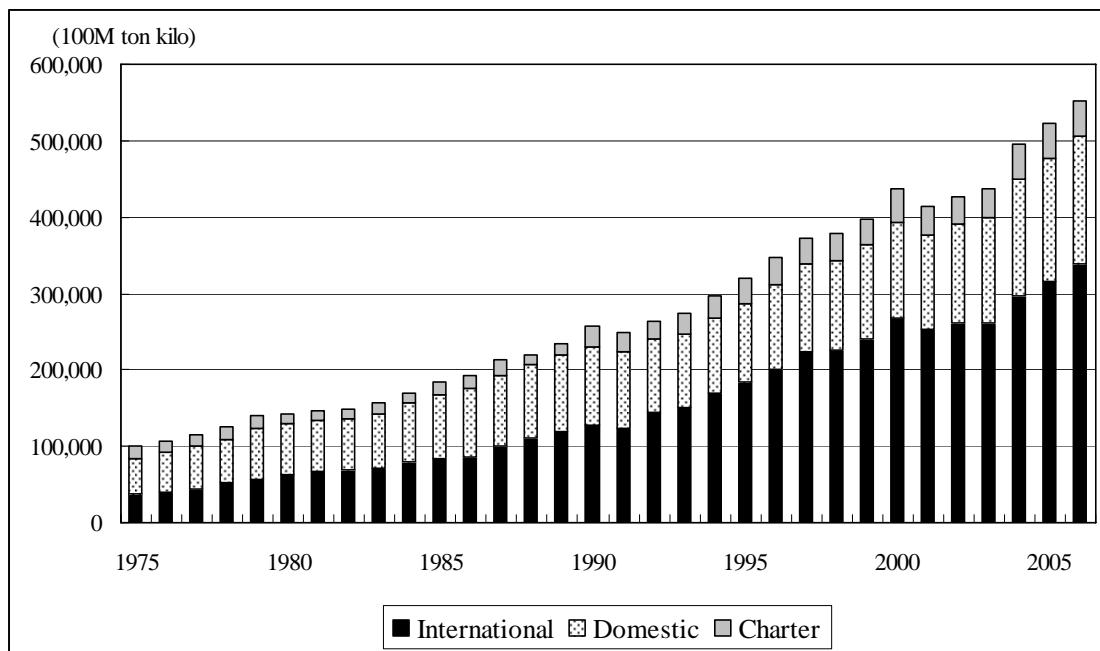
Source: AirAsia Annual report 2007, 2010

Figure 3-3-2 AirAsia Consolidated operating Passenger Carried 2002-2009

3.3.2 AIR TRAFFIC TREND (AIRCRAFT VOLUME, PASSENGER, CARGO)

There were significant aviation movements in 2009. The demand for air travel declined due to the aftermath of worldwide recession, including global devastations caused by the Lehman Shock, H1N1 flu virus and unstable fuel prices. Nevertheless, the IATA reported that aviation activities began to recover in the last quarter of 2009 and is expected to perform even well in 2010. The trend of air transport using Airbus was also foreseen increasing for 20 years since 2000 with annual growth rates of 6.8 % and 6.0 % for passenger and cargoes, respectively.

Furthermore, the outlook of the world international and domestic flight volumes from 1975 to 2006 based on ICAO statistics data, demonstrates an upward trend. In other aspects, world international flight volume has increased by around nine times while world charter and domestic flight volumes by around 3.5 times. Hence, the total flight volume has increased by around six times on the average.

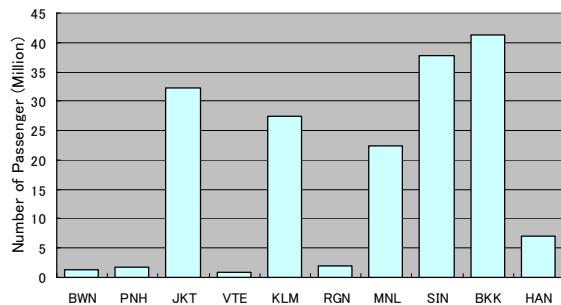


Source: ERIA Study Team based on ICAO

Figure 3-3-3 World Air Traffic Volume 1975-2006

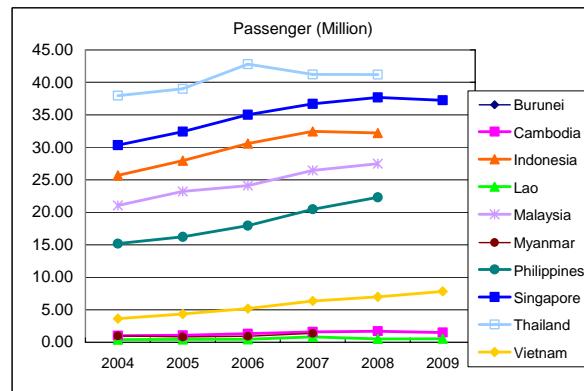
Asia region including AMSs also shows same air traffic trends on world air activity. The current feature of air traffic characteristics of capital airports and the past year's air traffic trends in AMSs are shown below. In 2008, there are more than 20 million annual passenger capital in AMSs' such as Ninoy Aquino (Manila), Kuala Lumpur, Soekarno Hatta (Jakarta), Changi (Singapore)and Survanabhumi (Bangkok). Aircraft movement at said airports also exhibit the same trend.

Meanwhile, in terms of cargo handling volume in 2008, Changi (Singapore) was the best airport among AMSs, and ranked 10th in the world.



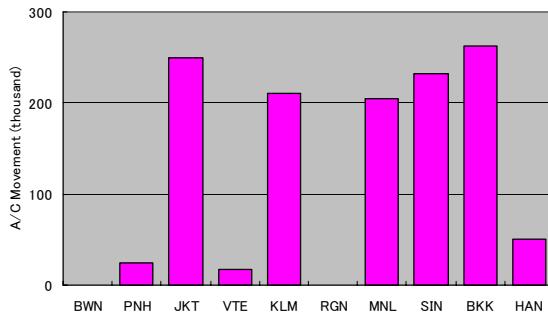
Source: ATWG ,AMS Website

Figure 3-3-4 ASEAN Number of Passengers in 2008



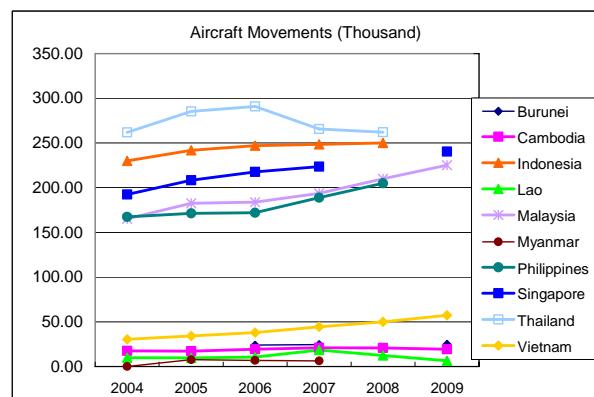
Source: ATWG ,AMS Website

Figure 3-3-5 ASEAN Number of Passengers (2004-2009)



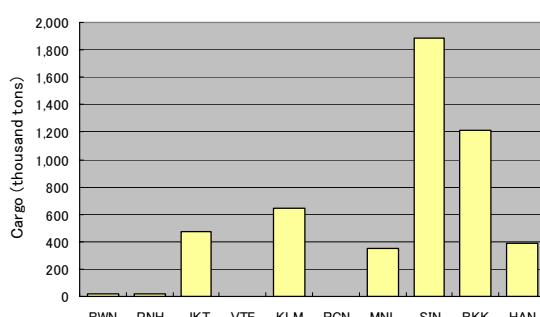
Source: ATWG ,AMS Website

Figure 3-3-6 ASEAN Number of Aircraft Movements in 2008



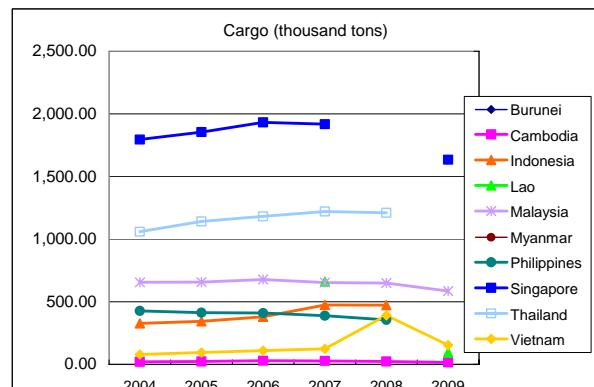
Source: ATWG ,AMS Website

Figure 3-3-7 ASEAN Number of Aircraft Movements (2004-2009)



Source: ATWG ,AMS Website

Figure 3-3-8 ASEAN Number of Cargo Volumes in 2008



Source: ATWG ,AMS Website

Figure 3-3-9 ASEAN Number of Cargo Volumes (2004-2009)

3.3.3 OPEN SKY

ASEAN, which has been promoting the establishment of AEC in 2015, must implement the Open Sky policy in order to accelerate growth of single aviation market in the air transport sector adopted in 1997. This form part of the ASEAN Vision 2020, ASEAN Transport Cooperation Framework Plan 1999-2004, ASEAN Transport Action Plan 2005-2010 and Roadmap for Integration of Air Travel Sector (RIATS) which started the step-by-step

liberalization of air services in the ASEAN region. Currently, AMSs through the Air Transport Working Group (ATWG) focus on the implementation of ASEAN Single Aviation Market (ASAM). This is described in the next clause.

(1) ASEAN Single Aviation Market (ASAM)

Report on “Developing ASEAN’s Single Aviation Market (ASAM) and Regional Air Services Arrangements with Dialogue Partner” was prepared by the ASEAN-Australia Development Cooperation Programme in 2008. This report proposed to establish the ASAM by 2015 including its key elements, implementation programme, policy implications, assessment of the economic impact and others.

The key elements shown below and principles, including recommendations and implementation timeline, were proposed.

- Airline ownership and control
- Market access
- Commercial opportunities, tariffs and user charges
- Market regulation
- Environmental and social impacts
- Harmonisation of safety/ technical regulation, ATM

The implementation timeline for ASAM and RIATS in 2014-2015 is shown Table 3-3-3.

Table 3-3-3 Roadmap for Establishment of ASAM and RIATS

2008-2009	2010-2011	2012-2013	2014-2015
ASAM			
1. Adopt concept, enabling framework for ASAM 2. Develop implementation arrangement/ Agreement on ASAM	Finalise: Implementation arrangements & Agreement on ASAM	Implementation of the ASAM Agreement/ Arrangements according to ASEAN-x formula (two or more States could sign the Agreement at this stage)	ASEAN-wide implementation of the ASAM Agreement/ arrangement
RIATS			
1. Conclude and sign ASEAN Multilateral Agreement for the Full Liberalisation of Air Services 2. Implement ASEAN Multilateral Agreement on Air Services (as per the RIATS Roadmap)	Implementation of the Multilateral Agreement on Air Services (as per the RIATS Roadmap)	Coincides with the ASEAN-wide implementation of the Multilateral Agreement on Air Services (as per the RIATS Roadmap)	

Source: Report of “Developing ASEAN’s Single Aviation Market and Regional Air Services Arrangements with Dialogue partner”

Also ASAM milestones and are described below.

- Milestone 1 (2014):
 - All Member States sign and implement the ASAM Agreement
 - Adoption of open 3rd, 4th, 5th, 6th freedom rights, limited 7th, 8th for passengers, open 7th for cargo
- Milestone 2 (2019-2020)

- Phasing out of remaining restrictions on ownership/ control, adoption of ASEAN Community Carrier criteria
 - 9th freedom rights introduced
- Milestone 3 (2022-2023)
- Final stage of ASAM. Removal of restrictions on 7th, 8th and 9th freedom rights

(2) Liberalization

History of liberalisation of air services started way back in 1944 after the World War II. At first, international air transport was governed by the restrictive bilateral air services agreement. It has gone through some transitions including the modernized form of liberalisation such as the US open sky policy and EU unlimited liberalisation as a single aviation market.

The following table shows the typical change of air services agreement in the world including the corresponding liberalisation levels.

Table 3-3-4 Type of Liberalisation of Air Services Agreement

Agreement Type	Bilateral route	5th traffic right	Code share	Capacity	Designation	Pricing	Ownership	7th traffic right	Cabotage
Conventional Bilateral	P	P	P	R	R	R	R	R	R
US Open sky	F	F	F	F	F	P	R	R	R
APEC Multilateral	F	F	F	F	F	F	P	R	R
EU Single market	F	F	F	F	F	F	F	F	F
Australia & New Zealand Single Market	F	F	F	F	F	F	F	F	F

Note: R: Restricted, P: Partial Liberalized, F: Full Liberalized

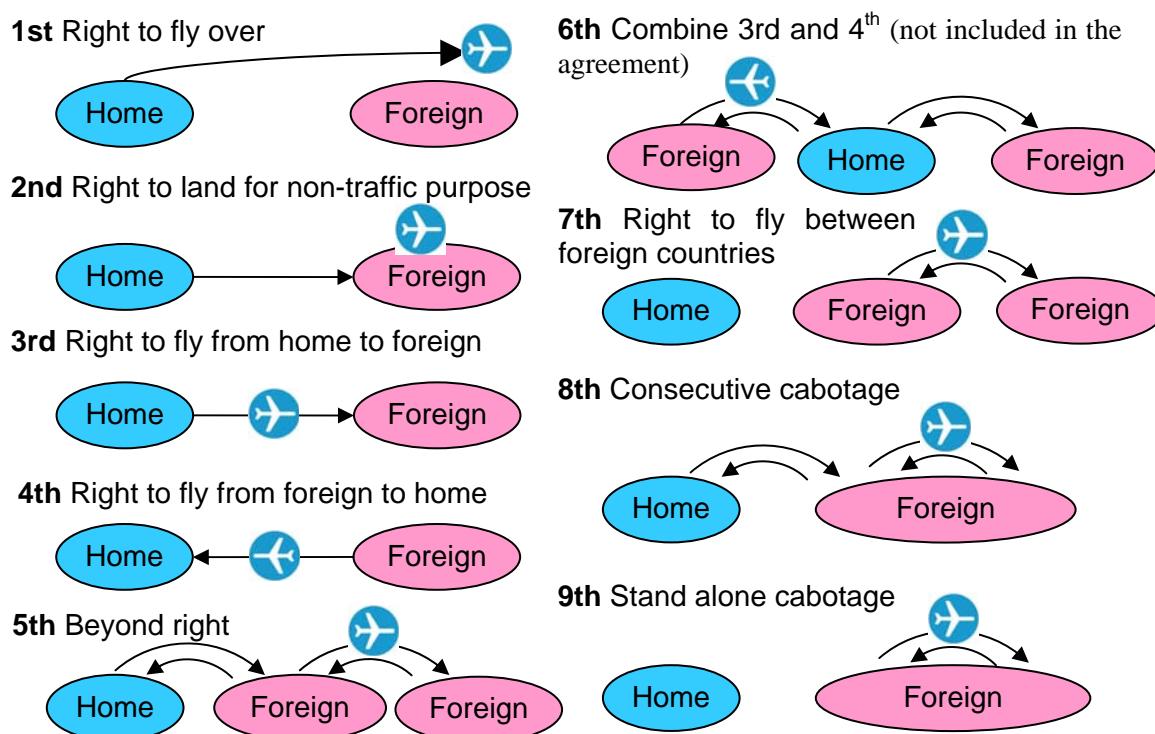
Source: Miwa and Hanaoka (2004)

(3) Freedoms of the Air

Each freedom is subject to specific conditions that are determined through bilateral agreements between any two of the countries that are parties to the Convention.

- 1) First Freedom: The right to fly and carry traffic over the territory of another partner to the agreement without landing.
- 2) Second Freedom: The right to land in those countries for technical reasons such as refuelling without boarding or deplaning passengers.
- 3) Third Freedom: The right of an airline from one country to land in a different country and board passengers coming from the airline's own country.
- 4) Fourth Freedom: The right of an airline from one country to land in a different country and board passengers travelling to the airline's own country.
- 5) Fifth Freedom: This freedom is known as "beyond rights". It is the right of an airline from one country to land in a second country, to then pick up passengers and fly on to a third country where the passengers then deplane.

- 6) Sixth Freedom: The right to carry traffic from one state through the home country to a third state.
- 7) Seventh Freedom: The right to carry traffic from one state to another state without going through the home country.
- 8) Eighth Freedom: This is consecutive cabotage. Airline cabotage is the carriage of air traffic that originates and terminates within the boundaries of a given country by an airline of another country.
- 9) Ninth Freedom: This is similar to the Eighth Freedom, and is the right to operate flights within a foreign country but without continuing or prior service to or from the airline's home country.



Source: ERIA Study Team

Figure 3-3-10 Freedom of the Air

3.3.4 AVIATION SECURITY

Establishment of AEC, single aviation market and open sky policy are undoubtedly necessary to achieve the economic development for AMSs. However, harmonized and integrated ASEAN should not only be convenience-oriented, but also consider coordinated security and safety which are essential prerequisites.

In the light of the terrorist attacks carried out with civil aircraft in the United States on 11 September 2001, enhancement measures including aviation screening has advanced worldwide to strengthen the counter-terrorism capabilities in the air transport sector.

After said attack, air transport sector particularly the aviation security continued to tackle countermeasures against terrorism that further occurred throughout the world, which includes the transatlantic aircraft plot in UK that launch introduction for prohibition all carry-on liquids in 2006, Glasgow International Airport attack in 2007, Detroit airliner incident in USA on 25 December 2009 and others.

As members of ICAO contracting states, AMSs have made considerable efforts to comply with the standards contained in ICAO Annex 17. In order to adapt to changes that the air transport sector faces, ICAO has been conducting a review of Annex 17 as necessary. Moreover, the Asia-Pacific Ministerial Conference on Aviation Security was held in Tokyo on March 2010, which adopted the Asia-Pacific Joint Declaration on Aviation Security.

(1) Major Components to Enhance Aviation Security

After the September 11 attack, each country, including AMSs, made efforts to enhance the aviation security to prevent against terrorism. The major components to enhance aviation are described below:

- Passenger
 - Hold baggage screening
 - Cabin baggage screening including liquid ban
 - Physical search of personnel
- Cargo and mail
 - Regulated Agent Regime
- Aircraft
 - Sky marshal
- Airport facility
 - Access control (door, gate and fence)
- Quality control
 - Audit/ inspection system
- Education and training
 - Security training course
 - Awareness training

(2) Passenger Screening

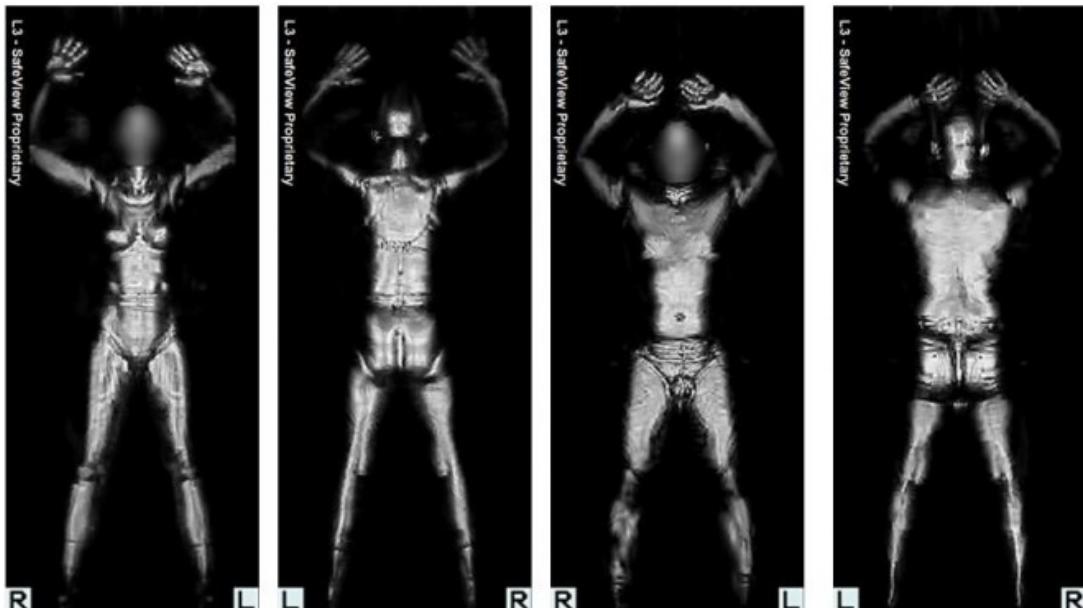
Today's aviation security authority faces major concerns related to the Christmas day bombing attempt on a Northwest flight bound to Detroit, where explosives concealed in the attacker's underwear was planned to be detonated.

- Therefore, the Transportation Security Administration (TSA) has tried out a series of "whole body imagers" to search for threats that typical metal detectors could not find. This new full body scanner equipment has been introduced in US airports by the TSA. The photo of actual full body scanner in the US airport and images it created are shown in figures below:



Source: Aviation security international 2010

Figure 3-3-11 Body Scanner (L-3 Technology)



Source: Aviation security international 2010

Figure 3-3-12 Scanned Body Images

The use of the full body scanner equipment does not seem to violate universal human rights. Thus, the use of such device will be accepted in time across the globe.

3.3.5 AVIATION SAFETY

Aviation safety is the most significant consideration and involves a wide range of fields as noted in the ICAO Annex. These fields include personnel licensing, operation of aircraft, airworthiness of aircraft, air traffic services, aircraft accident and incident investigation, aerodromes and others.

This clause focuses on air traffic services, i.e., the Communication Navigation Surveillance / Air Traffic Management (CNS/ ATM).

(1) Current Issues

The following Table 3-3-5 shows the current major issues to be solved in the implementation of new CNS/ATM in AMSs. These issues are not applicable to all AMSs because some of them have already developed CNS/ATM while some have not.

Such issues are classified into five major parts: namely i) systems development, ii) airspace, iii) O&M and HRD, iv) flight procedures/ air navigation standard and v) safety management system.

Table 3-3-5 Current Issues to be Solved for the New CNS/ATM

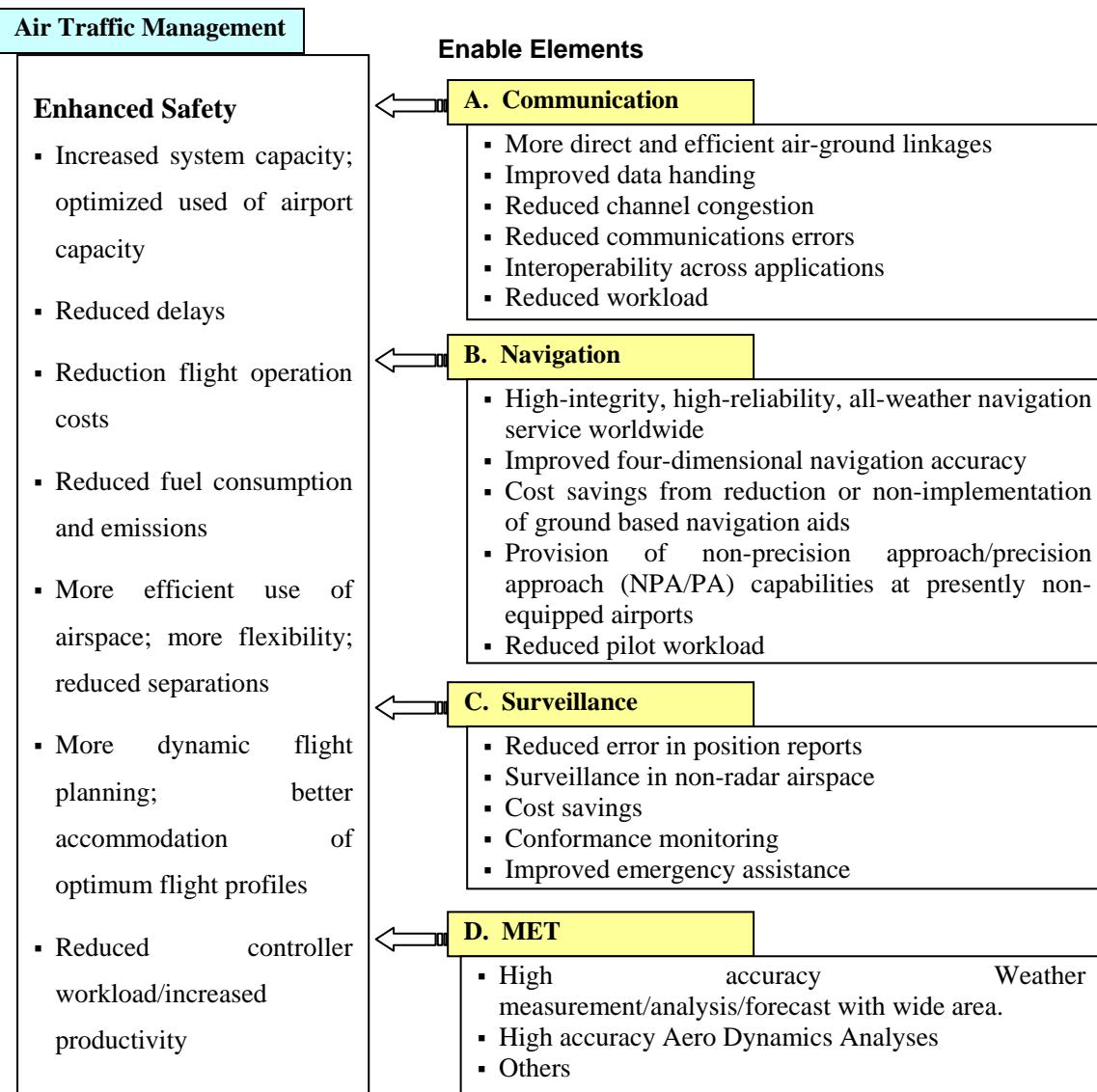
Issue	Condition
CNS/ATM Systems Development	<ul style="list-style-type: none"> ➤ Vagueness of Global Master Plan in ASEAN ➤ Existence of Low Reliable Equipment and Systems ➤ Lack of Concrete Action Plan through 2015 for Development
Airspace	<ul style="list-style-type: none"> ➤ Congestion of Major ER-Air Routes ➤ Congestion of Major Terminal Area ➤ Existence of Inefficient ATC Airspace
O&M, HRD	<ul style="list-style-type: none"> ➤ Lack of Human Resources for new CNS/ATM ➤ Lack of Integrated Systematic Manuals / Handbooks for New CNS/ATM Facilities ➤ Lack of Training System for New CNS/ATM
Flight Procedures / Air Navigation Standard	<ul style="list-style-type: none"> ➤ Securing Experts for PBN Flight Procedures ➤ Securing Experts for Air Navigation Standards
Safety Management System	<ul style="list-style-type: none"> ➤ Lack of Safety Management Manual ➤ Inefficiency of Safety Management System

Source: ERIA Study Team

(2) Possible Scenario to New CNS/ ATM

The following Figure 3-3-13 shows the expected benefits for ATM with the new CNS/ATM in ASEAN region based on ICAO Global Air Navigation Plan for CNS/ATM Systems (ICAO Doc. 9750 Second Edition 2002).

Expectation for Future ATM



Source: ERIA Study Team

Figure 3-3-13 Expected Benefits by Introduction of ATM

In order to implement the above ATM operation, the following systems will be vital elements from the viewpoint of CNS.

1) Communication

- ATS Message Handling System (AMHS)
- ATS Inter-facility Data Communication (AIDC)
- Aeronautical Telecommunication Network (ATN)
- Controller-Pilot Date Link Communications (CPDLC)

2) Navigation

- Aircraft Based Augmentation System (ABAS)
- Ground Based Augmentation System (GBAS)

3) Surveillance

- Automatic Dependent Surveillance – Broadcast (ADS-B)
- Automatic Dependent Surveillance – Contract (ADS-C)
- Secondary Surveillance Rader mode S (SSR Mode-S)
- Advanced Surface Movement Guidance and Control System (A-SMGCS)
- Multilateration

4) Meteorological (MET)

- Wide Area Forecast System (WAWS)
- Doppler Rader

In order to accept the above ATM plan, PBN is one of the new approaches for reaching the goal. The following Figure 3-3-6 shows the PBN Roadmap in the Asian and Pacific region planned by ICAO, compared with that of Japan. AMSs will follow this ICAO Roadmap which shows RNP 2 and RNP 4 being implemented by the year 2016 for oceanic routes, and RNAV 1 and RNP 2 being expected also by 2016.

Table 3-3-6 PBN Roadmap in Asia/ Pacific Region and Japan

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ICAO (Asia/Pacific)	Route-Oceanic	RNP(RNAV10)*		RNP2, RNP40 (RNAV10)*															
	Route-Remote Continental	RNP(RNAV10)*		RNP2 (RNAV2/RNP4/RNAV10)*															
	Route-Continental en-route	RNAV2, RNAV5		RNAV1, RNP2 (RNAV2/RNAV5)*														GNSS	
	TMA	RNAV1 (with RADAR) Basic RNP1 (no RADAR)		Expand RNAV1 or RNP 1 application Mandate RNAV1 or RNP1 approval in high density APO															
	Approach	RNP APCH with Baro-VNAV		Expansion of RNP APCH (wz Baro-VNAV) and APV															
		RNP ARAPCH		Expansion of RNP AR APCH														GNSS Landing	
Japan	En-route	RNAV5		RNP2													Mandate RNP2 at/above FL290		
	TMA	RNAV1 SID/STAR		Transmission from RNAV1 to RNP1													Mandate RNP1 at mid-high density APOs		
	Approach	RNAV (GPS)																	
		RNP APCH with Baro-VNAV		RNP APCH													Expect to mandate RNP AR		

Source: ICAO

(3) Recommendation

As a part of the ATM concept, PBN is one of vital factors which can accelerate the implementation of such concept. For the implementation of the ATM, each system of CNS mentioned shall be developed through the following:

- Recommendation 1: Integrated Global Master Plan for new CNS/ATM, which focuses on the ASEAN region should be formulated in terms of ATM for realizing the Seamless ASEAN Sky.
- Recommendation 2: PBN should be considered as one of the vital measures to properly implement the ATM concept. The introduction of PBN shall be in line with ICAO Roadmap in Asia and Pacific Region.
- Recommendation 3: The balanced development for ATM concept should be necessary. Proper enhancement for CNS is recommended.

3.3.6 ENVIRONMENTAL MEASURES RELATED AIR TRANSPORT SECTOR

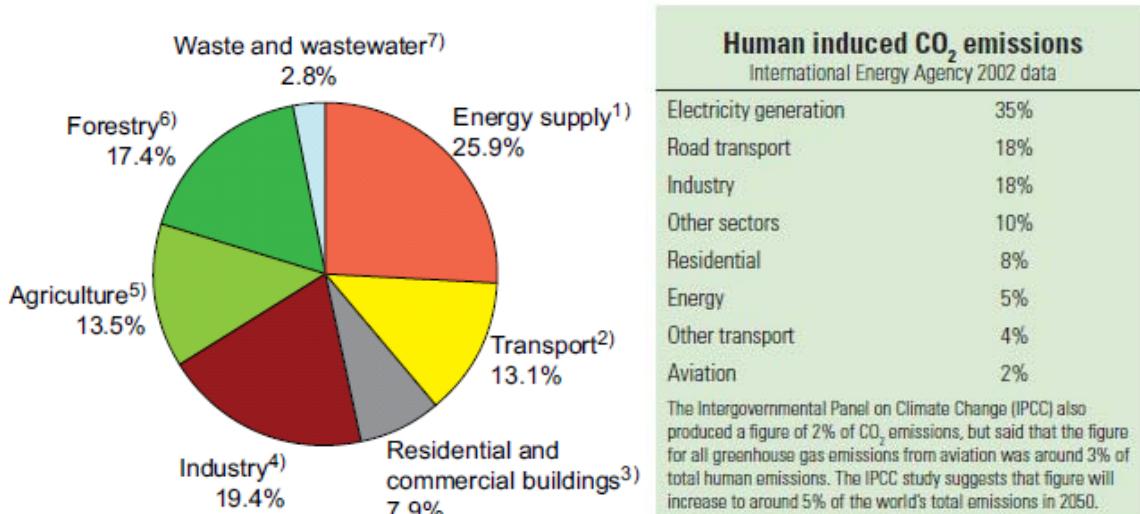
Environmental measures are one of the most significant issues for Air Transport sector in the ASEAN region. These include various concerns such as climate change, noise, air and water quality, and so on.

This clause highlighted climate change especially the reduction of Greenhouse Gas (GHG)/carbon emission. Even though air transport sector still only accounts for a small proportion of carbon (GHG) emission compared with other sector, work to reduce its environmental impact should be continued.

(1) Carbon (GHG) Emission

Carbon (GHG) emission by sector in 2004 detail is shown as chart in left of Figure 3-3-14. About 13 % of carbon (GHG) emissions were derived from the transport sector.

Air transport sector has an impact on climate change mainly through the carbon emission from aircraft operation. Moreover, globally, air transport sector accounts for 2 % of human-induced carbon (CO_2) emissions which are shown right of Figure 3-3-14.



Source: IPCC, ACI

Figure 3-3-14 Carbon (GHG) Emission by Sector (Left), Human induced Carbon (CO₂) Emission (Right)

(2) Reduction of Carbon (GHG) Emission

In order to reduce carbon or GHG emission at airports, several airport authorities and organizations and airline and aircraft/engine manufactures initiate related efforts and introduce countermeasure approaches such as technology, operational efficiency and infrastructure improvement.

- Technology: Ground Power Unit (GPU), Electrical Vehicle(EV) and New energy system
- Operational efficiency: Taxing time, fuel-efficient aircraft
- Infrastructure improvement: Rearrangement for facility layout,

(3) Emission Source related Aircraft Operation

In several reports conducted in Japan, carbon or GHG emission source from aircraft operation accounts for around 60 %. Meanwhile, those from related facility such as terminal building activities and vehicle activities account for around 30 % and 10 %, respectively.

Therefore, the Report of “Make Eco-airport come true” recommended three (3) proposals as shown in detail below.

1) Promotion of Utilization for GPU

Utilizing the GPU change over from Auxiliary Power Unit (APU) at the apron for parking of aircraft is commonly known to reduce the carbon (CO_2) emission drastically. For instance, in case of Boeing 777 aircraft, it can be reduced by 1/20 carbon (CO_2) emission hourly. Narita International Airport has high utilization factor of around 87 % in Japan 2006. The case study results which applied 90% utilization of GPU for some airports is described below in Table 3-3-7. The study result shows that in case of 90% GPU Utilization, carbon (CO_2) emission of - 0.8% can be reduced to 4.2 %.

Table 3-3-7 Case Study for GPU Utilization of Japanese Airports

Airport Name	Chitose	Narita	Kansai	Hiroshima	Miyazaki
Utilization GPU in 2006 ¹⁾	56%	87% ²⁾	69%	50% ³⁾	0%
Reduction ratio for application of 90% GPU Utilization	- 4.2%	- 0.8%	- 1.2%	- 1.3%	- 2.8%

Note: 1): Average of all category aircrafts at each airport

2): Only for installed parking spot data

3): Assumption for 50% due to unreliable data

Source: Report of “Make Eco-airport come true” (National Institute for Land and Infrastructure Management Japan: NILIM)

2) Introduction for Fuel-Efficient Aircraft

Boeing announced that B-787 Dreamliner is a super-efficient airplane with new passenger-pleasing features. It will bring the economy of large jet transports to the middle of the market, as it utilizes 20 % less fuel compared to any other airplane of the same size.

3) Reduction of Taxing Distance for Aircraft Operation

Rearrangement of existing airport facility is difficult to reduce the taxing distance for aircraft operation. However, with the increasing air traffic volume among AMSs, such reduction of taxing distance must be developed for each respective airport in the near future. Then consideration of taxing distance for aircraft operation contributes to the effective reduction.

(4) Environmentally-Friendly Action of AMSs

As part of ASEAN-Japan partnership, Ministry of Land Infrastructure, Transport and Tourism (MLIT), Japan, interview studied for capital airports in AMSs and gathered some present situations of environmentally-friendly actions which have introduced at the airport as summarized in Table 3-3-8.

Table 3-3-8 Eco-Friendly Airports Actions in AMSs

	BWN	PNH	CGK	VTE	KUL	RGN	MNL	SIN	BKK	HAN
1 Air Pollutant Emission Control										
1-1 Ground Power Unit	✓		✓	✓	✓					✓
1-2 Hydrant Refueling System	✓		✓		✓	✓	✓	✓		
1-3 Fuel truck refueling	✓			✓	✓	✓	✓	✓		
1-4 Clean vehicles						✓		✓		
2 Water Resource Consumption Control										
2-1 Rainwater	✓		✓		✓	✓				✓
2-2 Sewage			✓		✓			✓		✓
3 Water Pollution Prevention										
3-1 Rainwater	✓		✓		✓	✓	✓			
3-2 Sewage	✓		✓	✓	✓	✓	✓			✓
4 Wastes										
4-1 Facility for collecting and separating trash	✓				✓	✓	✓	✓		✓
4-2 Reusing recyclable waste								✓		
4-3 Composting and fertilizing raw garbage										
4-4 Biomass utilization system				✓						
5 Other										
5-1 Renewable energy									✓	
5-2 High-efficiency lighting system	✓				✓	✓		✓		✓
5-3 High-efficiency air conditioning facility	✓		✓		✓			✓		✓

Source: Report of “Basic study for Environmentally-friendly of Major overseas airports” (Japan Civil Aviation Authority of NILIM)

(5) EU Emission Trading System (ETS)

Emissions from Air Transport sector currently account for about 3% of total EU GHG or carbon emissions, but they are increasing rapidly by 87% since 1990 in EU. On current trends, Air Transport emissions are likely to more than double from present levels by 2020. This fast growth contrasts with the success of many other sectors of the economy in reducing emissions.

Therefore, EU Commission proposed the new directive for carbon or GHG emissions from flights to/ from and within the EU will be included in the EU ETS from 2012 and all airlines will be covered whatever their nationality including ASEAN carriers. The contents of directives are shown below.

- Aviation will be included in the EU ETS from 2012; a proposed one-year introductory phase for intra-EU flights starting in 2011 has been dropped
- Emissions from aviation will be capped at 97% of their average 2004-2006 level in 2012. This will decrease to 95% from 2013, although this percentage may be reviewed as part of the general review of the Emissions Trading Directive
- Airlines will receive 85% of their emission allowances for free in 2012. This percentage may be reduced from 2013 as part of the general review of the Emissions Trading Directive.
- An exemption has been introduced for commercial air operators with very low traffic levels on routes to, from or within the EU or with low annual emissions (less than 10 000 tonnes CO₂ a year). This means many operators from developing countries with only limited air traffic links with the EU will be exempt. This will not have a significant effect on the emissions covered by the EU ETS.
- A special reserve of free allowances has been added for new entrants or very fast-growing airlines. The reserve does not increase the overall cap on allowances and therefore does not affect the environmental impact of the system. Airlines that are growing will be able to benefit from the reserve up to a limit of one million allowances.

- A new mechanism has been introduced to ensure consistent and robust enforcement throughout the EU. As a last resort, Member States could ask for an operator to be banned from operating in the EU if it persistently fails to comply with the system and other enforcement measures have proven ineffective. (refer from EU web site)

3.3.7 PRIVATIZATION RELATED AIR TRANSPORT SECTOR

Basically, airport infrastructure development is implemented under the governments concerned. However, airport as the infrastructure of air transport sector recently loosens restrictions on foreign investment. Furthermore, foreign company enters into airport development projects in the world not only in the construction phase but also during operation.

From the viewpoint of maintaining the integrity of public fund, AMSs are willing to use private financial scheme such as PFI, BOT and BTO which are applied for the development of airports.

A major example on the utilization of foreign investment was the Philippines' Ninoy Aquino Airport Terminal 3 development project. This project was implemented by a consortium named PIATCO, jointly formed by Flughafen Frankfrut (German), Nisshoiwai (Japan), Singapore Chuan Hup Holding Limited and a Philippines' domestic company. It underwent litigation on bid-rigging case, delaying its operation for six years from the original schedule of 2008.

The Ministry of Transport and Communication of Thailand started considering the privatization of Airport Authority of Thailand (AAT) in 1998. The Airports of Thailand Public Company Limited (AOT) was corporatised from AAT, to be a public limited company on September 30, 2002 in order to promote the efficiency of airport operation, improve services for airport users and obtain financing from the private sector. Currently AOT has six international airports under responsibility; Bangkok/ Don Muang, Bangkok/ Suvarnabhumi, Chiang Mai, Phuket, Hat Yai Chiang Rai airports.

As discussed above, development and operation of airport under the private sector is necessary to pay attention for the future major theme.

3.4 MARITIME TRANSPORT

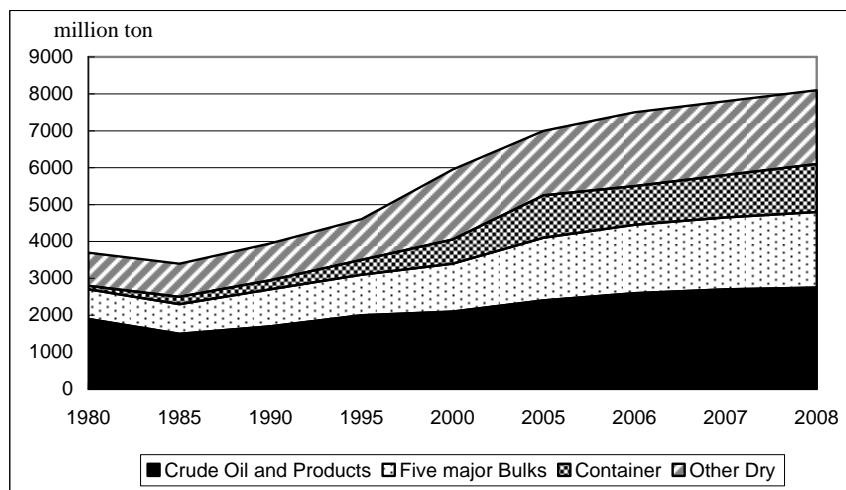
The maritime transportation takes the fundamental role in trading. Especially, liquid cargo (petroleum, oil products) and bulk cargoes (grain, fertilizer, cement, coal, iron ore and other minerals) have relied on maritime transportation. Recently, container terminal operation has been a beneficial business. Consequently, international hub ports such as Singapore Port, Tanjung Pelepas Port have sharply expanded their cargo throughput. Port serves as a gateway for freight and passenger to and from foreign countries, and has a function of connecting other transportation mode such as road and railway.

In this section, the current status of maritime transport of AMS, in terms of cargo throughput, 47 designated ports, safety, security, environment, privatization, cooperation with international organization and merchant fleet registration are discussed with certain issues highlighted.

3.4.1 CARGO THROUGHPUT

International maritime transport carries over 80% of the volume of world trade and takes the fundamental role in international logistics. According to the “Review of Maritime Transport 2009” by the United Nations, worldwide international seaborne trade in 2008 was 8.168 billion tons, of which 2.749 billion tons are for petroleum and oil products, 2.097 billion tons are for main bulks (iron ore, coal, bauxite/alumina, cement, grain, fertilizer) and 3.322 billion tons are for other dry cargoes, including containers. Worldwide international seaborne trade was below 4.0 billion tons in 1980, and has steadily increased with an average annual growth rate of approximately 3% as shown in Figure 3-4-1. Especially, container cargo has sharply increased, associated with regional economic growth and strong containerization development.

Malacca Strait located in Asian waters is the most crowded and significant shipping route. Most of the cargos transported between East-Asia and India/Europe/Middle East pass thorough Malacca Strait.

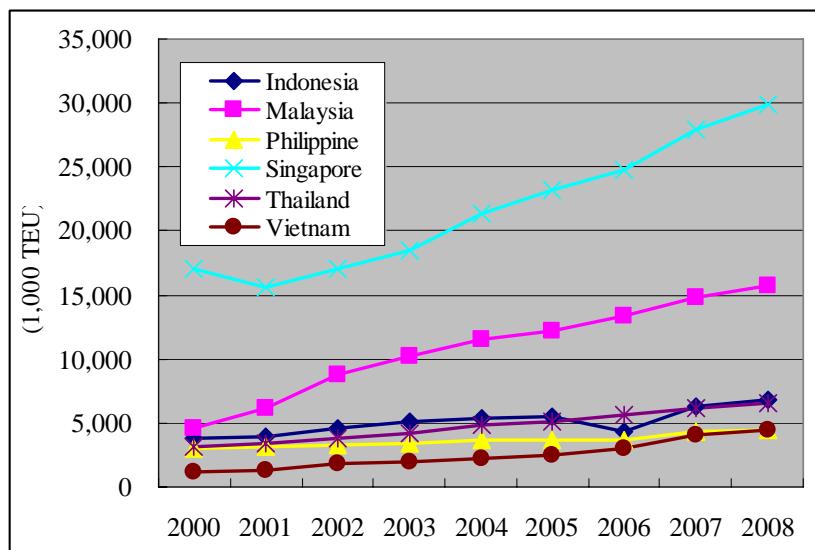


Source: Review of Maritime Transport 2009, UNCTAD Secretariat

Figure 3-4-1 International Seaborne Trade in the World

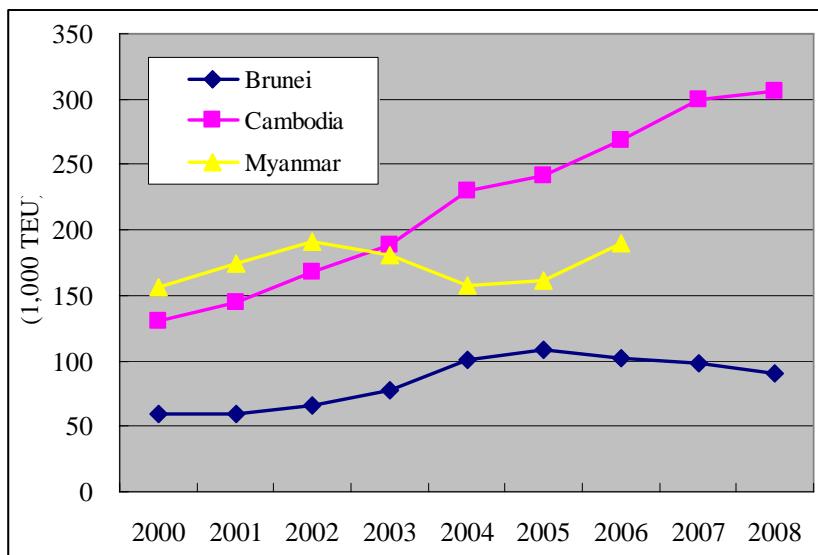
Total container cargo throughput of ASEAN countries, except for Myanmar, was 68.289 million TEU in 2008 and its average annual growth rate from 2000-2008 was 9.4%. Figure 3-4-2 and Figure 3-4-3 show the container throughput trend which is categorized into two groups by throughput: > or < 1.0 million TEU. Consequently, it is observed that Singapore and Malaysia has sharply increased. Singapore has taken a positive port sales based on high-performance service as an Asian hub port. Malaysia has also rapidly increased since Tanjung

Pelepas Port started its operation as a privatized port in 2000. Presently, mega carrier Maersk Line is the largest user of the port. Said port is the most convenient and controllable container terminal for Maersk Line as its hub in Asia.



Source: Containerization International Yearbook 2002-2010, AN BISSELL

Figure 3-4-2 Container Throughput of ASEAN Countries (Beyond 1 million TEU)



Source: 1) Port Authority of Sihanoukville, 2) Port Authority of Phnom Penh, 3) Myanmar Port Authority, 4) Ports Department, Ministry of Communications, Brunei Darussalam

Figure 3-4-3 Container Throughput of ASEAN Countries (Below 1 million TEU)

3.4.2 PORT STATUS OF 47 DESIGNATED PORTS

(1) Cargo Throughput

Preliminary 33 ports were identified as the main port for trans-ASEAN transport network in the ASEAN Transport Cooperation Framework Plan in 1999. The 1st Maritime Transport Working Group (MTWG) on February 2000 finalized the ASEAN -Wide Port System composed of 46 designated ports, which were adopted later at the 9th Senior Transport Officials Meeting (STOM) on April 2002. Finally, the research mission for this system

proposed that the port of Tanjung Pelepas should be added due to its emerging role in the region. Hence, a total of 47 designated ports were selected as shown in Table 3-4-1 and Figure 3-4-4.

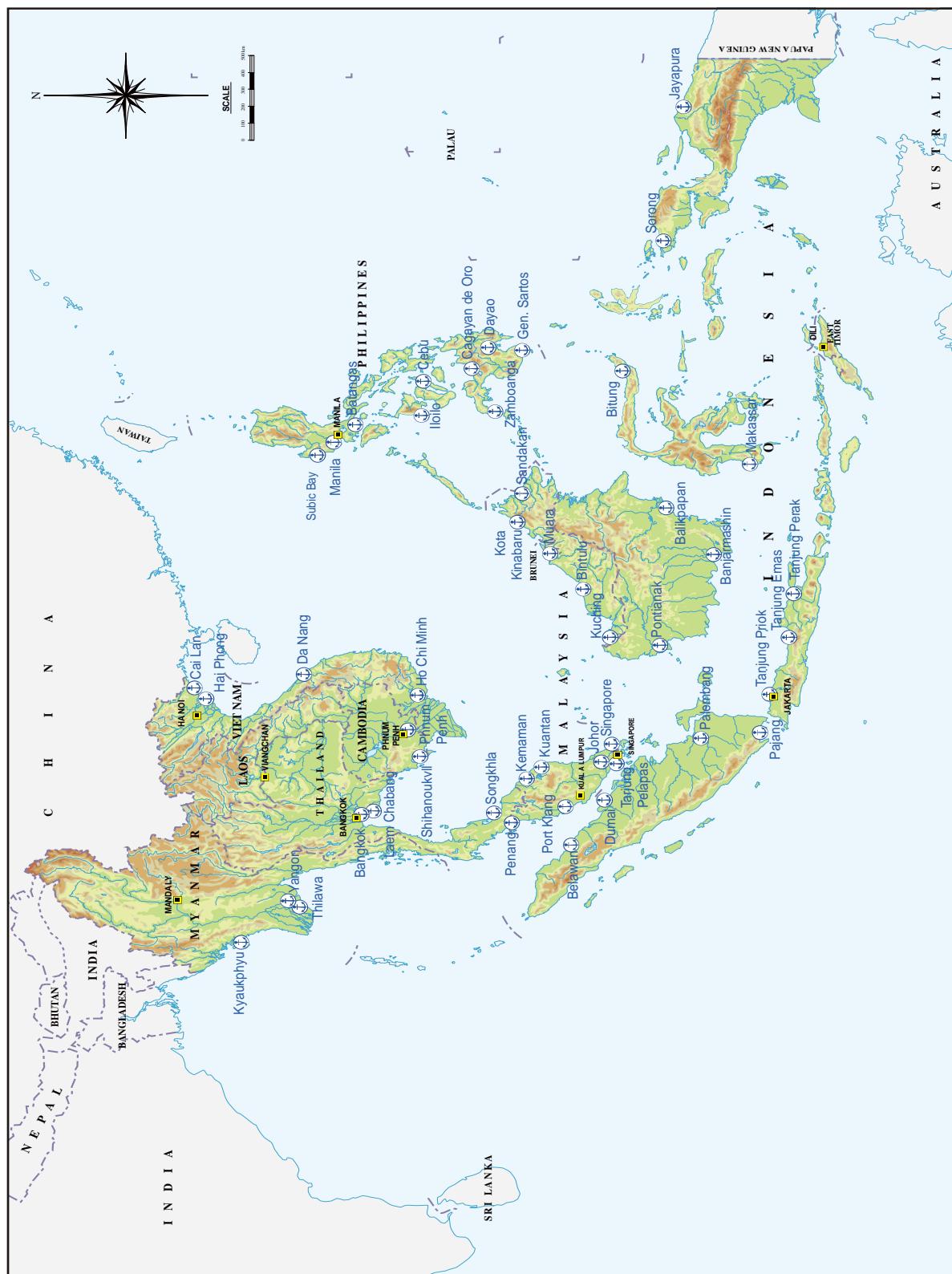
Table 3-4-1 Forty Seven Designated Ports

Country	Name of Port
Brunei Darussalam	Muara
Cambodia	Phnom Penh, Sihanoukville
Indonesia	Belawan, Dumai, Tanjung Priok, Palembang, Panjang, Pontianak, Tanjung Perak, Tanjung Emas, Makassar, Balikpapan, Banjarmasin, Bitung, Jayapura, Sorong
Malaysia	Port Klang, Penang, Johore, Tanjung Pelepas, Kuantan, Kemaman, Bintulu, Kuching, Sandakan, Kota Kinabalu
Myanmar	Yangon, Thilawa, Kyaukphyu
Philippines	Manila, Batangas, Subic Bay, Cebu, Iloilo, Cagayan de Oro, Davao, General Santos, Zamboanga
Singapore	Singapore
Thailand	Bangkok, Laem Chabang, Songkhla
Viet Nam	Ho Chi Minh, Hai Phong, Da Nang, Cai Lan

Source: ASEAN Secretariat

Table 3-4-2 shows the total cargo throughput and container throughput of the 47 designated ports in 2008. It was thus noted that the port of Singapore handled more than 500 million tons, including 300 million tons of container cargo and 167 million tons of liquid cargo. The 2nd ranking port among the ASEAN Countries is Port Klang with 152 million tons, followed by Tanjung Pelepas (88 million tons), Tanjung Priok (69 million tons), Laem Chabang Port (55 million tons), and Balikpapan Port (53 million tons).

On the Other hand, Regarding the container throughput, seven of the designated ports are ranked in “the World’s Top 50 Container Ports” in “Containerization International Yearbook 2010”, namely, Port of Singapore (1st, 29.9 million TEU), Port Klang (15th, 7.9 million TEU), Tanjung Pelepas (18th, 5.6 million TEU), Laem Chabang Port (21st, 5.2 million TEU), Tanjung Priok (25th, 4.0 million TEU), Ho Chi Minh Port (31st, 3.4 million TEU) and Manila Port (37th, 3.0 million TEU).



Source: ERIA Study Team

Figure 3-4-4 Location of the 47 Designated Ports

Table 3-4-2 Cargo Throughput of the 47 Designated Ports in 2008

Country	Port Name	Cargo Throughput			
		Total (tons)		Container (TEU)	
		50,000,000	100,000,000	2,500,000	5,000,000
Brunei	Muara		948,033		90,372
Cambodia	Phnompenh		1,119,645 *		47,349 *
	Sihanoukville		2,057,966		25,775
Indonesia	Belawan	20,094,000			590,069
	Dumai	6,168,000 *			0
	Tanjung Priok (Jakarta)	69,053,516 **			3,984,278
	Palembang	10,964,803			78,469
	Panjang	15,314,929			104,142
	Pontianak	4,233,845			132,732
	Tanjung Perak	12,011,157			1,119,353
	Tanjung Emas (Semarang)	6,784,097			373,644
	Makassar	10,147,382			353247
	Balikpapan	53,383,910			82,961
	Bitung	3,971,338			134,756
	Jayapura	882,834			42,563
	Sorong	909,422 *			9,339
	Banjarmasin	38,601,118			251,543
Malaysia	Port Klang	152,348,510			7,973,117
	Penang	25,999,896			929,639
	Johore (Pasir Gudang)	25,312,782			936,000
	Tanjung Pelepas	88,000,000			N/A
	Kuantan	9,405,465			127,061
	Kemaman	3,913,410			0
	Bintulu	40,470,300			290,167
	Kuching	11,460,182			291,063
	Sandakan	9,910,000			0
	Kota Kinabalu	6,758,793			193,854
Myanmar	Yangon		12,003,103		189,690
	Thilawa				
	Kyaikphyu	21,627			0
Philippines	Manila	40,303,151			2,997,022
	Batangas	606,626			497
	Subic Bay	3,135,870 **			29,370
	Cebu	26,348,803			495,829
	Iloilo	2,236,789			81,936
	Cagayan de Oro	327,623			13,636
	Davao	3,597,396			349,006
	General Santos	1,936,854			113,886
	Zamboanga	1,575,206			64,960
Singapore	Singapore	515,415,000			29,918,000
Thailand	Bangkok	17,767,818			1,460,713
	Laem Chabang	54,837,542			5,240,075
	Songkhla	1,830,381			140,356
Viet Nam	Ho Chi Minh	64,591,113			3,433,621
	Hai Phong	25,054,027			1,398,654
	Da Nang	2,784,517			61,881
	Cai Lan	2,740,700			102,061

Note: Bar lines represents the scale of total tonnage. Due to width limitation, blue and red bar lines are broken into number of lines and each representing a maximum of 100,000,000 tons and 5,000,000 TEU respectively.

*: Data in 2007 **: Estimated

Source: The ERIA Study Team arranged based on "The Study on Guidelines for Assessing Port Development Priorities including Acceptable Performance Levels in ASEAN, JICA"

(2) Cargo Handling Capacity

The JICA study team with Lead Coordinator Country, Brunei Darussalam has executed “The Study on Guidelines for Assessing Port Development Priorities including Acceptable Performance Levels in ASEAN” as Measure No.6 of the Maritime Roadmap. In this study, the estimation model for container cargo throughput capacity was proposed, and Table 3-4-3 shows the result of the estimation and actual container throughput per berth in 2008. In said figure, conventional berths without quay gantry crane installed are excluded from the estimation model and are marked with**. Moreover, conventional berths which are not fully equipped are marked with the sign*.

This model estimates the operational performance of a container terminal. Operational performance is generally lower than the design capacity due to seasonal changes in container transportation, redundancy for future demand and other operational reasons. Estimated capacity seems to be 75%-85% of the actual terminal capacity. However, it is observed that Sihanoukville Port, Tanjung Priok Port, Port Klang, Johore Port, Tanjung Pelepas Port, Bintulu Port, Yangon Port, Manila Port, Davao Port, Singapore Port, Bangkok Port, Laem Chabang Port, Ho Chi Minh Port and Hai Phong Port have been fairly full. In this case, increase in productivity or expansion of berth is required to be planned and executed in consideration of future cargo demands and individual port conditions.

Table 3-4-3 Comparison between Actual Cargo Throughput in 2008 and Estimated Capacity of 47 Designated Ports (1/3)

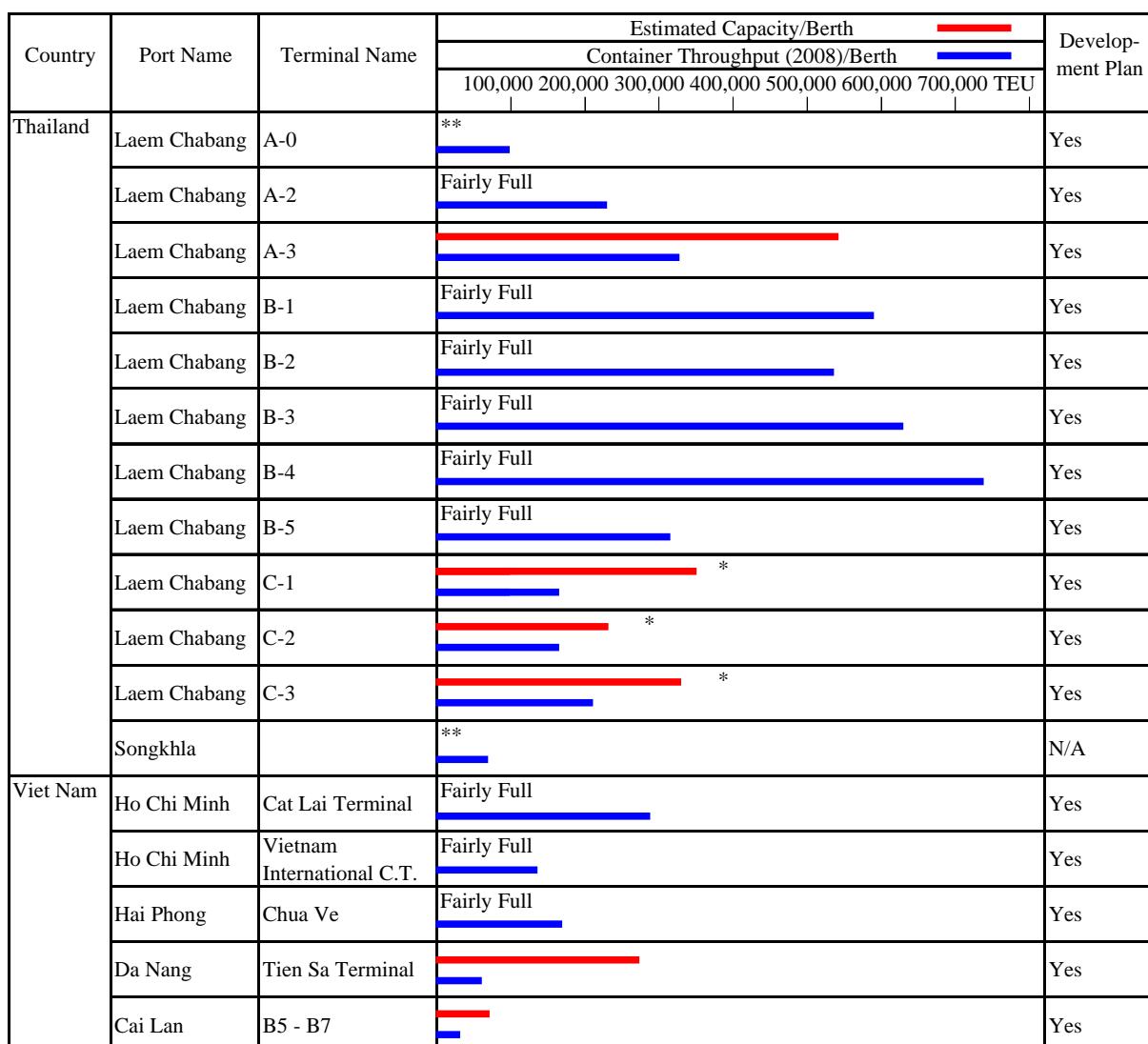
Country	Port Name	Terminal Name	Estimated Capacity/Berth							Development Plan Yes/No	
			Container Throughput (2008)/Berth								
			100,000	200,000	300,000	400,000	500,000	600,000	700,000 TEU		
Brunei	Muara	Muara Container Terminal								Yes	
Cambodia	Sihanoukville	New Container Terminal	Fairly Full							N/A	
	Phnompenh		**							Yes	
Indonesia	Belawan	International Terminal								Yes	
	Dumai		**							N/A	
	Tanjung Priok (Jakarta)	Jakarta International C.T								Yes	
	Tanjung Priok (Jakarta)	Terminal Petikemas Koja	Fairly Full							Yes	
	Tanjung Priok (Jakarta)	Multi Terminal Indonesia PT								Yes	
	Palembang	Container								Yes	
	Panjang	Container Terminal								Yes	
	Pontianak	Container Terminal	**							No	
	Tanjung Perak	Terminal Peti Kemas Surabaya								N/A	
	Tanjung Emas (Semarang)	Terminal Peti Kemas Semarang								Yes	
	Makassar	Makassar Container T.								N/A	
	Balikpapan	Semayang	**							N/A	
	Bitung	Bitung Container Terminal								Yes	
	Jayapura	Dermaga 1 and Dermaga 2	**							N/A	
	Sorong	Dermaga1	**							N/A	
	Banjarmasin	Trisaksti (Kade 1 sd 270)	**							N/A	
Malaysia	Port Klang	Northport								Yes	
	Port Klang	Westport	Fairly Full							Yes	
	Penang	North Butterworth Container T.								Yes	
	Johore (Pasir Gudang)	CT1 ~ 3	Fairly Full							No	
	Tanjung Pelepas	Bearth 1 - 10	Fairly Full							Yes	
	Kuantan									No	

Source: The ERIA Study Team arranged based on “The Study on Guidelines for Assessing Port Development Priorities including Acceptable Performance Levels in ASEAN, JICA”

Table 3-4-3 Comparison between Actual Cargo Throughput in 2008 and Estimated Capacity of 47 Designated Ports (2/3)

Country	Port Name	Terminal Name	Estimated Capacity/Berth							Development Plan	
			Container Throughput (2008)/Berth								
			100,000	200,000	300,000	400,000	500,000	600,000	700,000 TEU		
	Kemaman	East Wharf	**							Yes	
	Kemaman	West Wharf	**							Yes	
	Bintulu	BICT	Fairly Full							Yes	
	Kuching	Senari Terminal	**							N/A	
	Sandakan		**							N/A	
	Kota Kinabalu	Sapangar Bay Conteriner Port	**							N/A	
Myanmar	Yangon	AWPT	Fairly Full							Yes	
	Thilawa	Myanmar International Terminal Thilawa	**							Yes	
	Kyaukphyu		**							Yes	
Philippines	Manila	Port of Manila	N/A							N/A	
	Manila	North Harbor	N/A							N/A	
	Manila	South Habor	N/A							N/A	
	Batangas	Batangas Port		Red Bar						Completed	
	Subic Bay	New Container Terminal-1		Red Bar						No	
	Cebu	Cebu International Port	**							Yes	
	Iloilo	TMO-Loboc	**							Yes	
	Iloilo	TMO-Fort San Pedro	**							Yes	
	Cagayan de Oro	Cagayan de Oro	**							Yes	
	Davao	Sasa Wharf	Fairly Full							Yes	
	General Santos	General Santos Port	**							Yes	
	Zamboanga	Zanboanga Port	**							Yes	
Singapore	Singapore	All PSA	Fairly Full							Yes	
	Singapore	Jurong Terminal		Red Bar						Yes	
Thailand	Bangkok	Terminal 1	Fairly Full							None	
	Bangkok	Terminal 2	Fairly Full							No	

Source: The ERIA Study Team arranged based on "The Study on Guidelines for Assessing Port Development Priorities including Acceptable Performance Levels in ASEAN, JICA"

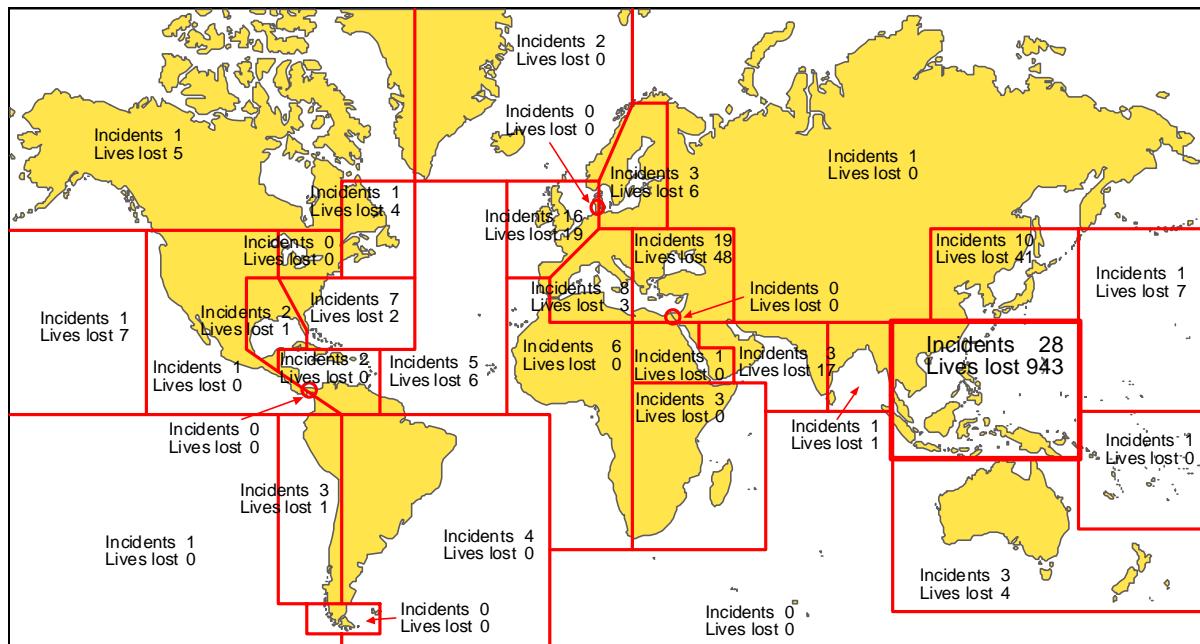
Table 3-4-3 Comparison between Actual Cargo Throughput in 2008 and Estimated Capacity of 47 Designated Ports (3/3)

Source: The ERIA Study Team arranged based on "The Study on Guidelines for Assessing Port Development Priorities including Acceptable Performance Levels in ASEAN, JICA"

3.4.3 SAFETY

In 2008, 127 maritime incidents and 1102 lives lost in the world were reported by the World Casualty Statistics 2008. Figure 3-4-5 shows the statistics for each of the 30 districts. It is observed that East Asian waters are the most dangerous areas where 28 incidents and 943 lives lost are identified, which are 22% and 86% respectively, of the total proportion.

In general, improvement of the navigation system/facilities, enhancement of seafarer education, and establishment of adequate maintenance system for vessels are urgently required in order to ensure navigational safety and reduce such incidents. As effective measure, implementation of the Long-Range Identification and Tracking System (LRIT) and introduction of an Automatic Identification System (AIS) are essential, and some AMS have already introduced and operated these systems. Furthermore, ASEAN Search and Rescue Exercise (SAREX) should be further activated and enhanced to reduce lives lost.



Source: World Casualty Statistics 2008, Lloyd's Register-Fairplay Ltd

Figure 3-4-5 Number of Incidents and Lives Lost per Zone

3.4.4 SECURITY

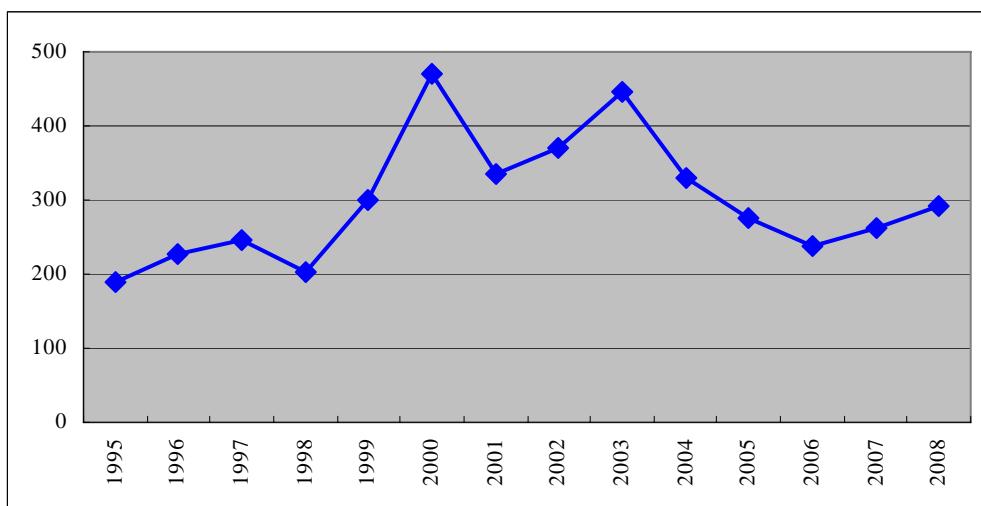
The International Maritime Bureau of the International Chamber of Commerce annually reports acts of piracy and armed robbery in the world waters. The number of said incidents increased from 2003-2006. Subsequently, it has been continuously increasing until 2008 as shown in Figure 3-4-6, with the number of said incidents reaching 293, which is 11% higher than that of 2007.

Figure 3-4-7 shows the main country/area (top seven) of piracy and armed robbery incidents. The number of incidents in the African region such as in the Red Sea/Gulf of Aden, Somalia and Nigeria has been sharply increasing in recent years, and is a serious issue for maritime transportation. Since June 2008, the United Nations Security Council has adopted a resolution for UN forces to take effective measures against such incidents, which is expected to increase.

On the other hand, the number of incidents in Southeast Asia has been decreasing with the enhancement of maritime security, as indicated in chart below. It was reduced to 43 in 2008 from 70 in 2007, particularly in Indonesia where it decreased to 28 in 2008 from 43 in 2007.

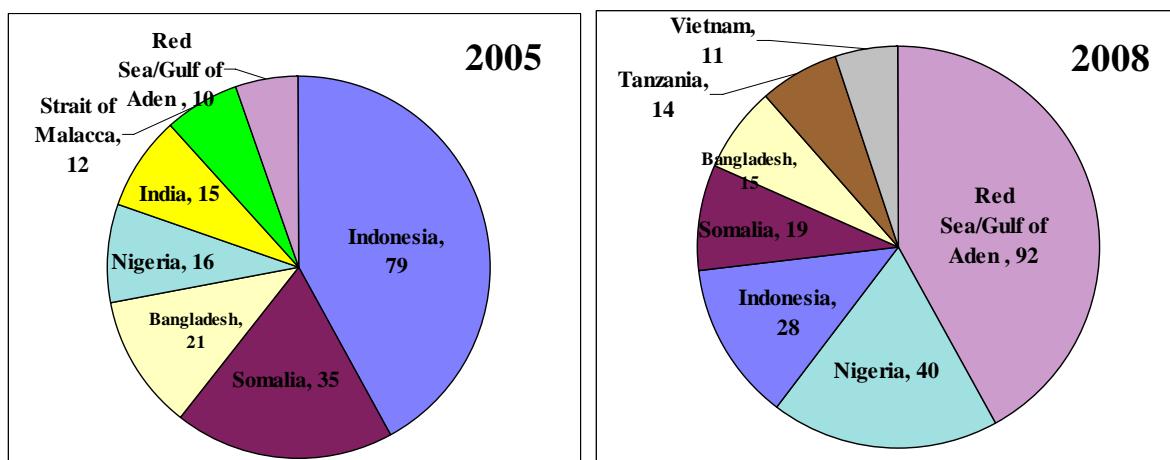
Due to concerns on the increasing number of such incidents, the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) was finalized on 11 November 2004 in Tokyo and came into force on 4 September 2006.

As of December 2009, 15 countries have signed and ratified the ReCAAP, namely, Bangladesh, Brunei Darussalam, Cambodia, China, India, Japan, Korea, Lao PDR, Myanmar, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam and Norway . Malaysia and Indonesia have also indicated their preparedness to cooperate with the ReCAAP. In order to manage and maintain the required information/statistics/report and provide appropriate alert signals, the Information Sharing Centre (ISC) was established in Singapore on November 2006.



Source: International Maritime Bureau, International Chamber of Commerce

Figure 3-4-6 Number of Piracy and Armed Robbery Incidents in the World Waters



Source: International Maritime Bureau, International Chamber of Commerce

Figure 3-4-7 Main Country/Area (Top 7) With Incidents of Piracy and Armed Robbery

3.4.5 ENVIRONMENTAL MEASURES

(1) Carbon (CO₂) Emission

Maritime transport emits the most efficient (exhausting CO₂ volume/transport length) in carbon (CO₂) compared to other transport modes. It is noted that carbon (CO₂) emissions from international shipping fleet are estimated to be between 1.6% and 4.1% of the world's carbon (CO₂) emissions from fuel combustion based on Review of Maritime Transport 2009.

Due to the increasing environmental awareness in the world, the second 'International Maritime Organization (IMO) GHG Study 2009' proposed to implement the available technical and operational measures to reduce carbon or GHG emissions as shown in Table 3-4-4. These measures are potentially significant in reducing the emissions rate by 25% to 75% compared to current levels. Furthermore, IMO's Maritime Environment Protection Committee (MEPIC) considers a number of mitigation measures aimed at reducing the carbon (CO₂) emissions from international shipping. ASEAN states are required to take these measures being members of IMO.

On the other hand, the Federation of ASEAN Shipowners' Association (FASA) has voluntarily supported the technical and operational measures to reduce carbon or GHG

emissions from ships. It also proposed the introduction of “GHG emission trading scheme” and establishment of “Global bunker levy (so-called GHG compensation fund)”.

Table 3-4-4 Potential Efficiency Gains of Selected Technology and Operational Measures

Strategy/Measure	Reduction (%)	Strategy/Measure	Reduction (%)
Diesel electric drives	5-30	Voyage planning and weather routing	<10
Wind power: Flettner rotor	<30	Overall energy awareness	<10
Ship speed reduction	<23	Optimum hull dimensions	<9
Bulbous bow	<20	Design for reduced ballast operation	<7
Wind power: kites and sails	<20	Lightweight construction	<7
Air lubricification	<15	Propeller efficient monitoring	<5
Counter-rotating propellers	<12	Efficient propeller speed modulation	<5
Waste heat recovery	<10	Hull coating	<5
Automation	<10	Efficiency of scale	<4
Port turnaround time	<10	Solar power	<4
Propeller surface maintenance	<10	Fuel additives	<2

Source: The Second IMO GHG Study 2009

(2) Oil Spill Incident

Once a major oil spill incident occurs, marine environment suffers from widespread tragic damage. A Memorandum of Understanding on the ASEAN Oil Spill Response Action Plan (OSRAP) was signed by the Government of Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore and Kingdom of Thailand in 1993, with a view on preserving the marine and coastal environment of the ASEAN Region against major oil spill incidents. It has set the establishment of regional and sub-regional ASEAN oil spill response centres as a long term goal.

OSRAP meetings were held almost annually at member states. The five member-states were provided by the Government of Japan with a grant for combating oil spills, particularly for the procurement of equipment such as oil booms, skimmers and dispersants and acquiring information system.

A focal points meeting for the ASEAN OSRAP was conducted on 8-10 June 2009 in Jakarta. The meeting was sponsored by IMO in collaboration with the Ministry of Transport and the Ministry of Environment, Republic of Indonesia, and reviewed the draft Strategy and Action Programme (SAP) to revitalize and strengthen the ASEAN OSRAP. Furthermore, it has been decided that further action, including the expansion of membership states, is to be submitted on the next formal meeting in Brunei Darussalam.

3.4.6 PRIVATIZATION

Private sector participation is suitable for port operations, especially on container terminal, from the viewpoint of 1) enhancement and establishment of national shipping route, 2) relieving governments from high investment burdens, and 3) introducing higher standard port operation efficiency through fair competition,. Privatization of container terminal has drastically expanded along the increase in container throughput since the middle of 1990s. APM Terminals (APM), Hutchison Port Holdings (Hutchison), PSA International Pte Ltd. (PSA), and Dubai Ports World (DPW), the so-called Four Mega Operators, are expanding their container terminal business operations all over the world as shown in Table 3-4-5. In ASEAN countries, they expand their operations in seven countries and eleven ports as shown in Table 3-4-6.

Privatization is the current economic wind. Gradual deregulation of port activity, not only port operation but also forwarding and shipping, is necessary for well-balanced national development.

Table 3-4-5 Current Status of Four Mega Operators in the World

Operator	Number of Operating Port	Number of Expanded Country	Container Throughput in 2008 (million TEU)
APM (APM Terminals)	50	34	7.80
Hutchison (Hutchison Port Holdings)	50	26	6.76
PSA (PSA International Pte. Ltd.)	28	16	6.32
DPW (Dubai Ports World)	48	32	4.68

Source: The Ports and Harbours, Vol.86, Japan

Table 3-4-6 Current Status of Four Mega Operators in ASEAN Countries

Country	Port	Operator
Brunei	—	—
Cambodia	—	—
Indonesia	Tanjung Priok	Hutchison
	Tanjung Perak	DPW
Malaysia	Port Kelang	Hutchison
	Tnajung Pelepas	APM
Myanmar	Thilawa	Hutchison
Philippines	Manila	DPW
Singapore	Singapore	PSA
Thailand	Laem Chabang	PSA, Hutchison, DPW, APM
	Cai Mep Thi Vai	PSA, Hutchison, APM
	Hiep Phouc (HCM)	DPW
	Hai Phong	APM

Source: ERIA Study Team

3.4.7 COOPERATION WITH INTERNATIONAL ORGANIZATION FOR PORT ACTIVITIES

The Inter-Governmental Maritime Consultative Organization (IMCO) was established in Geneva in 1948. Its name was later changed to IMO in 1982. Its main task is to develop and maintain a comprehensive regulatory framework for shipping. Presently, its scope includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping. IMO consists of Assembly, Council, Maritime Safety Committee, Marine Environment Protection Committee, Legal Committee, Technical Co-operation Committee, Facilitation Committee) and Secretariat. An assembly meeting is usually held every two years.

As of April 2010, its number of members is 169 states and associate members consisting of three states. ASEAN states, except for Lao PDR, have been inducted members. Lao PDR is a land-locked country, but has own shipping fleet for transporting to and from foreign countries

through ports in its neighbouring countries, for instance, Vung Ang Port, Viet Nam. Thus, it is recommended that Lao PDR should be among the inducted member of IMO.

Table 3-4-7 and Table 3-4-8 show current IMO-initiative convention status of ASEAN states as of April 2010. In order to enhance and improve safety and security, and to preserve environment, ASEAN states are required to sign and enforce the following conventions and take effective measures based on conventions.

Table 3-4-7 Current Maritime Convention Status Regarding Safety and Security

	SOLAS Convention 74	SOLAS Protocol 78	SOLAS Protocol 88	LOAD LINES Convention 66	LOAD LINES Protocol 88	TONNAGE Convention 69	COLREG Convention 72	CSC Convention 72	CSC amendments 93	STCW Convention 78	STCW-F Convention 95	SAR Convention 79	STP Agreement 71	STP Protocol 73	INMARSAT Convention 76	INMARSAT OA 76	INMARSAT amendments 94	FACILITATION Convention 65	SUA Convention 88	SUA Protocol 88	SUA Convention 2005	SUA Protocol 2005	
Brunei Darussalam	x	x		x	x				x						x	x	x		x	x			
Cambodia	x	x	x	x	x	x			x										x	x			
Indonesia	x	x		x		x	x	x	x			x	x	x	x	x	x	x					
Malaysia	x	x		x		x	x		x				x	x									
Myanmar	x	x		x		x	x		x										x	x			
Philippines	x			x		x			x			x		x	x				x	x			
Singapore	x	x	x	x	x	x	x		x	x			x	x	x	x	x	x	x	x			
Thailand	x			x		x	x		x				x	x				x					
Viet Nam	x	x	x	x	x	x	x		x	x			x	x	x	x	x	x	x	x	x	x	

Note: x; signed, blank; not yet signed

Source: International Maritime Organization

Table 3-4-8 Current Maritime Convention Status Regarding Environmental Preservation

	MARPOL 73/78 (Annex I/II)	MARPOL 73/78 (Annex III)	MARPOL 73/78 (Annex IV)	MARPOL 73/78 (Annex V)	MARPOL Protocol 97 (Annex VI)	London Convention 72	London Convention Protocol 96	INTERVENTION Convention 69	INTERVENTION Protocol 73	CLC Convention 69	CLC Protocol 76	CLC Protocol 92	FUND Convention 71	FUND Protocol 76	FUND Protocol 92	FUND Protocol 2003	OPRC Convention 90	HNS Convention 96	BUNKERS CONVENTION 01	ANTI FOULING 01	BALLASTWATER 2004	NAIROBI WRC 2007	HONG KONG SRC 2009	
Brunei Darussalam	x							x	x	x	x	x												
Cambodia	x	x	x	x				x	x	x					x									
Indonesia	x							x		x	x													
Malaysia	x			x				x		x	x			x	x	x	x	x	x	x				
Myanmar	x																							
Philippines	x	x	x	x	x				x					x										
Singapore	x	x	x	x	x				x	x	x			x		x	x	x	x	x				
Thailand	x								x							x								
Viet Nam	x									x														

Note: x; signed, blank; not yet signed

Source: International Maritime Organization

3.4.8 MERCHANT FLEET REGISTRATION

The capacity of the world merchant fleets registered in the world has steadily increased with an average annual growth rate of 2.5% since 1980, and reached 831 million gross tones in 2008. On the other hand, the capacity of merchant fleets registered in AMS was 66 million gross tones, which was 8.0 % out of the world total. It has sharply increased due to rise in cargo demand, and its average annual growth rate from 1980-2008 was recorded to be 6.2%.

Among AMS, Singapore has especially expanded the capacity of merchant fleets registered in its own states. It could be supposed that open registry policy, which is open for foreign owned company with duty to fulfil some requirements, impacts on the increase in fleet registration. Cambodia and Viet Nam also operates the so-called open registries, and its fleet registration has steadily increased.

Table 3-4-9 Capacity of Merchant Fleets Registered in AMS

(Unit: 1,000GRT)

Country	1980	1990	1995	2000	2005	2008
Brunei Darussalam	1	358	366	361	479	494
Cambodia			60	1,792	1,850	2,096
Indonesia	1,412	2,179	2,771	3,387	4,305	5,810
Malaysia	702	1,718	3,283	5,665	5,758	7,078
Myanmar	88	827	523	512	436	166
Philippine	1,928	8,515	8,744	7,192	5,268	5,029
Thailand	392	615	1,743	1,962	3,026	2,842
Viet Nam	241	470	700	929	1,671	2,993
Singapore	7,664	7,928	13,611	23,414	30,823	39,886
World Total	419,911	423,627	490,662	573,121	665,506	830,660
ASEAN Total	12,428	22,610	31,801	45,214	53,616	66,394
ASEAN Share	3.0%	5.3%	6.5%	7.9%	8.1%	8.0%

Source: Review of Development in Transport in Asia and the Pacific 2009, ESCAP

3.5 TRANSPORT FACILITATION

Well-facilitated transport is essential to create an efficient and integrated logistics and multi-modal transport system for seamless movement of goods, connecting air, maritime, railway, inland-waterway and road transport.

To implement the ATAP 2005-2010, three transport facilitation agreements, ASEAN Framework Agreement on the Facilitation on Goods in transit, Multimodal Transport and Inter-state Transport, have been concluded. These agreements have figured prominently in each semi-annual TFWG discussion. This chapter will describe the updated status of each framework agreements at the beginning.

Transport facilitation and trade facilitation are very linked/overlapped to each other. To achieve the goal of the transport sector, it is necessary to cooperate with other authorities as ATAP includes concerted actions with customs procedure. The following section will discuss issues of transport and trade facilitation as well as detailed current status of three principal agreements and their protocols.

3.5.1 ASEAN FRAMEWORK AGREEMENTS ON TRANSPORT FACILITATION

The goal of transport facilitation in the region is to create an efficient and integrated logistics and multi-modal transportation system for facilitating seamless movement of goods. To implement the ATAP 2005-2010, three transport facilitation agreements namely, ASEAN Framework Agreement on the Facilitation on Goods in transit, Multimodal Transport and Inter-state Transport, has been concluded. Implementation including ratification of agreement/protocol, however, varies in countries. Below is the description of these three agreements:

(1) ASEAN Framework Agreement on the Facilitation of Good in Transit (AFAFGIT)

1) Objectives of the agreement

The objectives of this agreement are;

- To facilitate transportation of goods in transit, to support the implementation of the ASEAN Free Trade Area, and to further integrate the region's economies
- To simplify and harmonize transport, trade and customs regulations and requirements for the purpose of facilitation of goods in transit; and
- To establish an effective, efficient, integrated and harmonized transit transport system in ASEAN.

2) Current Status

This frame work agreement was finalized and signed in 1999. It has 9 protocols as its integral parts and concerned Working Groups are designated for the ratification and monitoring the progress of these protocols. The current status including ratifications and the concerned issues related to each protocols are discussed below:

Protocol 1 - Designation of Transit Transport Routes and Facilities

Protocol 1 was signed on 8th February 2007. The STOM shall be the responsible body for the monitoring, review, coordination and supervision of all aspects to the Protocol. In the protocol, transit transport routes are designated in the appendix and it is addressed in article 2 that “the affirmation shall be with the mutual agreement of the immediate neighbouring Contracting Party or Parties.” To expedite the ratification process of the Protocol, it is suggested to AMS to issue a letter to its neighbouring Member States to confirm the designated transit routes which has been identified under this Protocol.

Protocol 2 – Designation of Frontier Posts

Protocols 2 and 7 are under the responsibility of the ASEAN Directors-General of Customs and have been specifically tasked to the CPTFWG. The amended text of the Protocol 2 was tabled at the 4th CPTFWG Meeting in March 2008 for the consideration of AMS. To share information on the status of the finalization of the Protocol, Joint TFWG and CPTFWG Coordination Meeting was held on 2 Oct 2009 in Singapore.

Protocol 3 – Types and Quantity of Road Vehicles

Protocol 3 has been signed on 15 September 1999 and ratified by 10 countries. This Protocol has entered into force as of May 2010. There has been antinomy between the Protocol and AFAFIST in respect of the number of vehicles that can be authorized for transit transport and are as follows.

Article 4 in Protocol 3 of AFAFGIT: “...The Contracting Parties hereby agree that the number of road transit transport vehicles which shall be allowed to be used for transit transport shall be no more than sixty (60) vehicles per Contracting Party.”

Article 9 of AFAFIST: “...the number of interstate transport vehicles allowed to be used for inter-state transport shall be no more than five hundred (500) vehicles per Contracting Party”

In the inaugural meeting, TTCB agreed that once the vehicles authorized for inter-state transport, they can be used for transit transport with liberal approach to set the quotas of transit transport vehicles. It was agreed that the number of vehicles that could be authorized for transit transport would be 500 vehicles per Contracting Party.

Protocol 4 – Technical Requirements of Vehicles

Transport operators are required to register vehicles to be used in transit transport under Protocol 4 which is signed in 1999 and ratified by 10 countries. This Protocol has entered into force as of May 2010To implement this protocol, each country has to establish registration and certification procedures. For the purpose of simplification and harmonization, the necessity to exchange information on the procedures was considered as one of the important step. In this regard, the TTCB meeting tasked the TFWG to discuss with AMS on the possibility of simplification and harmonization of the procedures and draft the mechanism for the exchange of registration procedures across AMS. Based on this, TFWG will report its recommendation to the TTCB in the next scheduled meeting for their consideration.

Protocol 5 – ASEAN Scheme of Compulsory Motor Vehicle Third-Party Liability Insurance

Protocol 5 was signed on April 2001 and has entered into force in September 2003.

The Council of Bureau, which was established to coordinate and supervise the legal, technical, administrative and financial operations of the National Bureaux, was suspended. The TTCB requested the ASEAN Insurance Regulators Meeting (AIRM) and the Council of Bureaus to work on developing the insurance scheme and its extension to all vehicles under the AFAFGT and the AFAFIST. After AFAFIST and enforcement of Protocols 1, 2, 3 and 4, the scheme should be ready to operate.

Protocol 6 – Railways Border and Interchange Stations

The finalization of Protocol 6 has been postponed until the SKRL Project is completed. Even in the absence of Protocol 6, AFAFGT can be implemented for the purpose of transit transport by road. It was agreed in TTCB meeting that the negotiation of Protocol 6 is deferred till such time that the missing links/spur-lines of the SKRL have been completed. On the bilateral basis, Cross-border rail protocols exist between the China and Viet Nam and between Thailand and Malaysia. A new train service operating from Bangkok in Thailand to Thanalaeng in Lao PDR opened in March 2009.¹

Protocol 7 – Customs Transit System

This Protocol is under the responsibility of the ASEAN Directors-General of Customs and has been specifically tasked to the CPTFWG. Joint TFWG and CPTFWG Coordination Meeting were held on 2 Oct 2009 in Singapore to share information on the development of work under the Protocol. To achieve greater synergy and convergence for the timely operationalisation of AFAGIT, the text of the Protocol and its technical appendix have been reviewed and finalized by the Legal Services and Agreements of the ASEAN Secretariat.

Protocol 8 – Sanitary and Phytosanitary Measures

Protocol 8 is signed on October 2000 and ratified by 10 countries as of August 2010. The ASEAN Senior Officials Meeting of the ASEAN Ministers on Agriculture and Forestry (SOM-AMAF) shall be the responsible body for the Protocol. To implement the Protocol, TTCB addressed that there is a necessity to strengthen the coordination among relevant bodies and Coordinating Committee for the Implementation of ASEAN Trade in Goods Agreement (ATIGA) and establishment of arrangements and inspection procedures to facilitate the transit transport of Sanitary and Phytosanitary (SPS) goods.

¹ Connecting greater Mekong subregion railways a strategic framework , ADB August 2010

Protocol 9 – Dangerous Goods

This Protocol was signed on 20th September 2002. The Protocol defines and identifies “dangerous goods” with an establishment of a permit scheme. Permit schemes of NTTCCs will be followed by TTCB with the support of STOM. UN Model Regulations, European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) has been adopted by the TTCB.

(2) ASEAN Framework Agreement on Multimodal Transport (AFAMT)

The AFAMT is patterned based on the pertinent provisions of the UN Convention on International Multimodal Transport of Goods, 1992 UNCTAD/ICC Rules for Multimodal Transport Documents and Decision 331 and 425 on International Multimodal Transport by the Commission of the Cartagena Agreement.² The signing of the AFAMT will further facilitate the door-to-door delivery of goods in ASEAN, using various modes of transport, under a single transport document.

1) Objectives

ASEAN have recognized:

- That international multimodal transport is one means of facilitating the expansion of international trade among the members of ASEAN as well as between a Member Country and Third countries;
- The need to stimulate the development of smooth economic and efficient multimodal transport services adequate to the requirements of international trade;
- The desirability of adopting certain rules relating to the carriage of goods by international multimodal transport contracts, including provisions concerning the liability of multimodal transport operators;
- The need to create a balance of interests between users and suppliers of international transport services; and
- The need that this Agreement should not affect the national law relating to regulations and control of unimodal transport operations.

2) Current Status

This agreement has been singed on 17 November 2005 by all AMS and only three countries have ratified as of March 2010. In the last TTCB meeting, Brunei Darussalam, Indonesia, Malaysia and Viet Nam mentioned that they will ratify the agreement within a year. The details are shown in Table 3.5.1.

(3) ASEAN Framework Agreement on the Facilitation of Inter-State Transport (AFAFIST)

The first draft for the facilitation of inter-state transport was introduced in the ASEAN and Transit Transport Agreement was presented by Thailand during the 4th STOM in Cebu, the Philippines in September 1997³. All AMS has signed the AFAFIST by December 2009.

1) Objectives

The objectives of this agreement are:

² ‘Implementation of Multimodal Transport Rules, UNCTAD 2001

³ The 25th ASEAN Senior Transport Officials Meeting Document, The ASEAN Secretariat’s Discussion Paper

- To facilitate inter-state transport of goods between and among the Contracting Partners to support the implementation of the ASEAN Free Trade Area, and to further integrate the region's economies
- To simplify and harmonize transport, trade and customs regulations and requirements for the purpose of facilitation of inter-state transport of goods; and
- To work in concert towards establishing an effective, efficient, integrated and harmonized regional transport system that addresses all aspects of inter-state transport.

2) Current Status

Myanmar had secured her domestic clearance and signed the AFAFIST during the 15th ATM Meeting on 10th December 2009. Accordingly the agreement has been signed by all AMS. Follow up action will consist of the commencement of the domestic ratification procedures by all AMSs. Only three countries, Cambodia, Philippines and Thailand, have ratified the agreement. The details are shown in Table 3-5-1.

(4) Overview of Three Framework Agreements

Table 3-5-1 shows the current status of ratification and the internal formality to enact necessary domestic laws and regulations. These will also affect the framework agreement. As shown in the table, the Protocol 2, 6 and 7 has not finalized nor has been signed by AMS. However, in the last few years, finalization, signing, and ratifications for agreements and protocols have been accelerated. For example AFAMT and AFAFIST have been signed. However, efforts are required for its actual operationalisation.

While actions in ATAP and Roadmap for the Integration of Services have focused on three Framework Agreements, STOM and related Working Groups are not responsible for the implementation of Protocol 2, 5, 7 or 8 of AFAFGIT. Nevertheless, cooperation and sharing of information between TFWG and other main implementing bodies are important to accelerate the implementation of these agreements.

Table 3-5-1 Status of Ratification for ASEAN Transport Facilitation Agreement

AGREEMENT/PROTOCOL	DATES OF SIGNING	DATES OF RATIFICATION BY MEMBER STATES									DATE OF ENTRY INTO FORCE
		BRN	CAM	INA	LAO	MAL	MMY	PHL	SIN	THA	
ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAGIT)	16/12/98	15/8/00	30/4/99	13/1/00	21/12/99	2/3/99	16/12/98	20/5/99	2/10/00	17/2/99	24/6/99
Protocol 1	8/2/07	9	19/10/09	27/10/09				13/11/07			2/10/00
Protocol 2											
Protocol 3	15/9/99	8/9/04	9/5/07	23/6/00	19/1/00	24/7/09	21/8/00	25/11/99	2/5/06	19/4/10	15/11/99
Protocol 4	15/9/99	8/9/04	9/5/07	23/6/00	19/1/00	24/7/09	21/8/00	26/11/09	2/5/06	19/4/10	15/11/99
Protocol 5	8/4/01	8/4/02	30/1/02	30/7/02	6/11/02	26/3/02	16/10/03	22/9/03	29/8/02	8/1/03	2/7/01
Protocol 6											16/10/03
Protocol 7											
Protocol 8	27/10/00	7/8/10	23/5/03	31/12/02	9/5/01	10/8/10	10/9/02	26/11/09	3/3/06	23/8/03	29/3/01
Protocol 9	20/9/02	30/3/04	9/5/07	29/8/03	19/5/03	25/4/03	5/5/03	12/9/07			15/11/02
ASEAN Framework on Multimodal Transport (AFAMT)	17/11/05		27/10/09					30/6/08		11/7/08	
ASEAN Framework Agreement on the Facilitation of Inter-State Transport (AFAFIST)	10/12/09										

Source: ERIA, ASEAN Secretariat
Note. ^a AFAMT's entry into force is on the 30th day after the deposit of the second instrument of ratification or acceptance, and is effective only among ASEAN Member States that have ratified it or accepted it. ^b BRN=Brunei Darussalam, CAM=Cambodia, INA=Indonesia, LAO=Lao PDR, MAL=Malaysia, MYS=Myanmar, PHI=Philippines, SIN=Singapore
THA: Thailand VNM=Viet Nam

(5) Implementation Arrangement for Three Framework Agreements

1) TTCB

ASEAN Transport Cooperation Framework Plan (1999-2004) specified establishment and institutionalization of the National Transit Transport Coordinating Committees (NTTCCs) and Regional Transit Transport Coordinating Board (TTCB). The functioning of the TTCB is to oversee the overall coordination and implementation of three framework agreements, AFAFGT, AFMT and AFAFIST. For better coordination, the Chairmanship and Vice Chairmanship of TTCB and TFWG shall be from the same member state and shall meet once a year. It is also expected to endorse a comprehensive work plan, which has been prepared with support from the APRIS Technical Assistant Team.

TFWG shall be the main supporting body to assist TTCB in matters related to the implementation of the agreements. In addressing relevant issues, TTCB shall also be supported by relevant ASEAN bodies, including

- Customs Procedures and Trade Facilitation WG,
- Land Transport WG,
- Relevant working group/committee that may be assigned by the SOM-AMAF, and
- A Council of Bureaux and/or AIRM.

The TOR of TTCB has been revised and the scope of NTTCCs and TTCB was expanded to cover AFAMT and AFAFIST as well as AFAFGIT in 2009 and it was adapted in 15th ATM. The Inaugural TTCB Meeting was held in Jakarta on 5-6 November 2009. The board proposed overall work plan with a timeframe from 2010-2015. APRIS II Consultant has supported in the preparation of the work plan, which is under review by each nation. The work plan currently contains 55 main deliverables and 144 measures. However, it is suggested to update it annually prior to the TTCB meeting. Currently Terms of Reference of TTCB has been adapted.

2) NTTCCs

NTTCCs are expected to develop and adopt annual overall work plans at national levels. This will be based on the TTCB work plans and AMS requirements. The activities may include composition of organizational structure with member's details, implement the plan and resolve concerned issues.

Currently all AMS have established NTTCCs or identified the organization which undertakes a role of NTTCCs. Table 3-5-2 shows the detailed status of NTTCCs in each country.

In GMS Cross Border Transport Agreement (CBTA), 6 countries have established National Transport Facilitation Committees (NTFC) in coordination and support from the ADB. These committees have been conformed to NTTCC in each country. CBTA was originally trilateral agreement between Viet Nam, Thailand, and Lao PDR in 1999. Later, by 2003, Cambodia, China and Myanmar also signed the Agreement.

The activation of the NTTCCs and the meeting of the TTCB will provide a mechanism which will ensure the accelerated and harmonized progress in future.

Table 3-5-2 Status of NTTCCs Establishment

	Established Organization	Chaired by	Remarks
Brunei Darussalam	NTTCC	The Permanent Secretary of Ministry of Communications.	
Cambodia	NTTCC		To oversee existing cross border transport facilitation arrangements with Lao PDR, Thailand and Viet Nam and future implementation of AFAFGIT and CBTA for GMS.
Indonesia	NTTCC	Secretary-General of Ministry of Transportation. - The meeting of the	NTTCC has been convened once and was decided to revise the Decree to accommodate all related institutions / stakeholders. The revised Decree on transit was being developed;
Lao PDR	National Transport Committee (NTC)	The Minister of Public Works and Transport.	NTC covers NTTCC for ASEAN and National Transport Facilitation Committee (NTFC) for GMS transport facilitation agreements.
Malaysia	NTTCC	Deputy Secretary General of Ministry of Transport.	
Myanmar	National Transport Facilitation Committee (NTFC)	The Deputy Minister, Ministry of Rail Transportation.	Covering both ASEAN (NTTCC) and GMS (NTFC)
Philippines	NTTCC	The Undersecretary for Road Transport and involving all related agencies.	
Singapore	NTTCC involving related agencies	The Group Director of the Land Transport Authority;	
Thailand	NTFC	The Permanent Secretary of Ministry of Transport,	To handle ASEAN and other multilateral agreements on transport facilitation covering movement of goods and people.
Viet Nam	NTFC	The Vice Minister of Transport,	To handle ASEAN and other multilateral agreements on transport facilitation covering movement of goods and people.

Source: ERIA Study Team, data based on Three Framework Agreements and Meeting Record of ASEAN

3) Other Implementation Assistance

There is some implementation assistance for the Three Framework Agreements in the form of ASEAN joint meetings with other WG or dialogue partners.

As one of the assistance activities under the new ASEAN-EU project scheme, it was proposed to prepare and implement the AFAFGT, AFAMT, AFAFIST and other relevant ASEAN

transport agreements. This will facilitate in the movement of goods and passenger vehicles, and implementation of connectivity initiatives. The following activities were executed:

- Special Meeting of the CPTFWG on ASEAN Customs Transit System (ACTS) under APRIS II Programme has been held twice.
- ASEAN-EU Programme for Regional Integration Support (APRIS II) funded the study on “Implementing the Transport Protocols 3, 4, and 5 under the AFAFGT”. The study objective was to identify and eliminate the barriers that are obstructing the effective implementation of Transport Protocols 3, 4 and 5.
- Scoping and needs assessment study on developing implementation strategy for the Operationalisation of the ASEAN Transport Facilitation Agreements has secured technical and funding support from the ASEAN – Australia Development Cooperation Programme (AADCP)
- On 2 October 2009, the 1st Joint Meeting of the TFWG and CPTFWG on the Implementation of the 1998 AFAFGT was held in Singapore. Since Transport Facilitation covers some trade facilitation measures, TFWG exchanged their experience and information with CPTFWG to accelerate the implementation of Protocol 2 and Protocol 7 of AFAGT.

3.5.2 INSTITUTIONAL AND HUMAN RESOURCE DEVELOPMENT

With the growth of global trade and increasing security threats to the international movement of goods, more efficient and safe logistics are required in international transport and trade system. Since it is getting more difficult for conventional freight forwarding operation to meet the changing international need, institutional and human recourse development needs to be accelerated.

(1) Human Resource Development

According to FIATA, today an industry covers approximately 40,000 forwarding and logistics firms, also known as the "Architects of Transport", employing around 8 - 10 million people in 150 countries.⁴ The performance of logistics highly depends on to skills, knowledge, and competencies of personnel involved in transport and logistics-related work. To realize efficiently facilitated intra and inter-ASEAN movement of goods, there is a pressing need for human resource development.

Education and training opportunities for logistics varies in AMS. Country Survey in ASEAN Logistics Development Study showed that extensive education and training opportunities are available in Singapore, Thailand, Malaysia and Philippines. They have already established a certain level of human resources development Programme while those opportunities are hardly existent in CLMV and Brunei Darussalam. Current progress by AFFA and STOM under the actions of Roadmap for the Integration of Logistics Services came out with increase in development plans to provide training and education in those countries recently.

(2) Human Resource Development in ASEAN Transport Cooperation

To achieve the efficient and seamless transport logistics systems, AMSs are developing human resources and planning capacity building Programmes for managers and operators. Although actions of ATAP and Roadmap stated its implementation in each time frame, the actual progress has just started.

In ATAP 2005-2010, the following two actions related to human resource development are stated;

⁴ FIFATA, 2010 <http://www.fiata.com/index.php?id=30>

- **TF No.7** Conduct training/skills upgrading Programmes (e.g., seminars, workshops, etc) to enhance institutional and human capacity in the implementation of the ASEAN transport facilitation agreements.
- **TF No.8** Promote ASEAN transport intermediaries such as freight forwarders MTOs, logistics service providers, truck/haulage operators

To improve and progress on transport and trade services, the Roadmap for the Integration of Logistics Services also specified and endorsed the following four actions;

- **No.39:** Develop and upgrade skills and capacity building through joint trainings and workshops
- **No.40:** Encourage the development of national skills certification system for logistics service providers
- **No.41:** Encourage the development of an ASEAN common core curriculum for logistics management, and
- **No.42:** Encourage the establishment of national / sub-regional centre of excellence (training centre).

The above roadmap actions are implemented under the responsibility of STOM and AFFA. AFFA proposed the logistics-related courses namely Fundamentals of Logistics Management, Multimodal Transport and International logistics, and Supply Chain Management. These courses will facilitate in the integration and enhancement of logistics services and cover the measures No.37, 39, and 41 of the Roadmap. In addition to above courses, AFFA also proposed Diploma in International Freight Management.

To implement measure No.42, AMS except for Cambodia, Lao PDR, Myanmar and Viet Nam have established their national training centres for logistics. Myanmar has taken certain actions to establish it and Viet Nam instead of logistic centre has established the freight forwarding centre. AFFA may extend its support in the establishment of Logistic Centre in Cambodia and Lao PDR.

Also, according to the 7th AFFA forum, Thailand extended a capacity building Programme for the successful implementation of multimodal transport in CLMV nations. In addition, Brunei Darussalam plans to undertake its national capacity building for multimodal transport training. They need assistance on the sourcing of experts, possibly from UNESCAP/AFFA.

It is to be noted that the above mentioned capacity building Programmes have just been initiated and need to be continued. In other words, the two ATAP actions (TF No. 7 and No. 8) need to be continued with much more focus during the ASTP 2011-2015 too.

(3) Capacity Development Programmes by ASEAN Dialogue Partner

1) ASEAN-Japan Comprehensive Economic Partnership

Under the concept of “ASEAN-Japan Comprehensive Economic Partnership,” the ASEAN-Japan Transport Logistics Improvement Plan (A-J TLIP) was established at the 3rd ASEAN-Japan Transport Ministers Meeting (ATM+J). Since then, Japan formulated the guideline and has been providing the capacity development Programmes for transport logistics under the A-J TLIP.

ASEAN-Japan Transport Logistics Improvement Plan (A-J TLIP)

- adopted at the 3rd ATM+J in 2005,
- is aimed for the improvement of logistics-related infrastructure, institutions for logistics, and transport activities through logistics service providers.

Guideline for ASEAN-Japan Transport Logistics Capacity Building (A-J TLCB)

- adopted at the 5th ATM+J in 2007,
- is an outline for an operational method and a cooperative framework regarding the capacity building Programme

In the guideline, individual objectives are indicated for governments, associations, managers and operators of logistics as follows;

- **For governments (In charge of transport logistics):** The government who is in charge of transport logistics need to acquire skills to establish policies, laws and supporting systems for the industry in the ASEAN region.
- **For logistics associations:** Logistics associations, especially for management personnel, need to acquire knowledge and skills on organizational start-up, management and strategies in ASEAN region.
- **For managers of logistics companies (Truck, Warehousing, Forwarding and etc.):** Management personnel need to acquire skills to manage the company effectively, deliver quality services to the customers and consider environmental aspects. These ideas will lead them to a higher level of management.
- **For operating staff of logistics companies:** Operating personnel need to acquire knowledge and operating skills on driving, cargo handling, warehousing, etc. in order to provide safe and reliable just-in-time services to customers.

Under this guideline Programme, Seminars and workshops were held in each ASEAN countries from 2007-2009. Policy Dialogue & Workshop has been held in Lao PDR and Thailand. Following studies has been conducted in these three years;

- FY 2007: Study on logistics training system and qualification system in Japan
- FY 2008: Study on logistics training system and qualification system in ASEAN
- FY 2009: Formulating a sustainable training / qualification system and compiling a text book for basic transport operations

2) Programme for Improving Efficiency of Logistics and Distribution of the East-West Corridor and the Southern Economic Corridor

Japan has worked and exchanged experiences with the countries of the Mekong Region in diverse fields and currently providing support to two such corridors namely, the East-West Economic Corridor connecting Viet Nam, Laos, Thailand, and Myanmar, and the Southern Economic Corridor linking Thailand, Cambodia, and Viet Nam.

Japan is currently supporting the above corridors in enhancing efficient logistics system, Programmes for improving efficiency of logistics and distribution of the East-West Corridor and the Southern Economic Corridor. The term "economic corridor" refers to roads, bridges, and other transport infrastructure that passes through several countries, enabling the active movement of people and products across national borders.

The Programme has two parts as follows;

Table 3-5-3 Programme for Improving Efficiency of Logistics and Distribution of the East-West Corridor and the Southern Economic Corridor

Part A	<ul style="list-style-type: none"> • Function enhancement project for customs clearance • Improvement project for physical distribution base • Development project for roadside station and appurtenant facilities • Human resource development project <ul style="list-style-type: none"> - Developing Curriculum's and Text Books - Conducting Pilot lecture for Logistics Service Providers in CLMV
Part B	<ul style="list-style-type: none"> • Establishment of logistics training centre • Sub-regional logistics training centre (Viet Nam)

Under this Programme, Human Resource Development Programme will be implemented in CLMV with two projects, namely, developing curriculums and text books, conducting pilot lecture for logistics service providers in CLMV as proposed above.

3) Assistant Programme by UNESCAP

In order to improve domestic capacity in logistics training and examination, UNESCAP has conducted surveys for the HRD needs in logistics and provided training manuals to enhance the professional competence and skills to LSPs and freight forwarders.

The Programme of assistance has two components;

- The preparation of an interactive manual on training fundamentals and
- The conduct of workshops on training fundamentals

This manual is on the training fundamentals and is designed to assist trainers from national training institutes and trainers from the transport industry in delivering the training material related to freight forwarding, multimodal transport and logistics. The draft manual was validated at the Training of Trainer workshop (TOT) organized by ESCAP in conjunction with the AFFA in 2000.

As well as assistance by Dialogue partners, continued intra-ASEAN cooperation in respect of human resource development including training in other countries is considered of value.

(4) Institutional LSP capacity developing

With the growth of global trade and increasing security threats to the international movement of goods, the customs administrations are shifting their focus more on securing the international trade flow and speeding up the collecting customs duties. To meet that demand, the capacity development of logistics service providers is of prime importance along with governments and institutions as well.

Authorized Economic Operator (AEO) Programme has been developed to accelerate and simplify the customs procedure to logistics service provider. who has been approved by or on behalf of a national customs administration. This will be done in compliance with World Customs Organization (WCO) or equivalent supply chain security standards. In ASEAN, Singapore has already entitled AEO Programme under the name of Secure Trade Partnership (STP). Since most members of WCO have acceded to Standards to Secure and Facilitate (SAFE) framework in the world, promoting AEO Programmes in ASEAN are expected in the near future.

Third party Logistics (3PL) facilitated in realizing high quality logistics including 'Just in Time' or Supply Chain Management (SCM). According to the Council of Supply Chain Management Professionals' glossary, Third party Logistics (3PL) is defined as "A firm [that]

provides multiple logistics services for use by customers. Preferably, these services are integrated, or "bundled" together, by the provider. Among the services 3PL provide are transportation, warehousing, cross-docking, inventory management, packaging, and freight forwarding."

According to Integration of ASEAN's Priority Sectors (Phase 2), the major use of 3PL services are by multinational companies (MNCs) only. Such 3PLs are very active in Singapore and Malaysia. Of the world's top 25 Third party Logistics (3PL) companies, 17 of them have their base in Singapore. The top 10 Third party Logistics (3PL) companies in Malaysia are foreign-owned.

(5) Development Agenda

Although ATAP actions and the Roadmap stated the time-frame for the implementation of institutional and human resource development, the actual progress has just started. Considering that such development requires long-term approach with continuous efforts, it is suggested to continue this with much focused approach and further acceleration.

Manuals and guidelines have been provided by dialogue partners and international organizations such as UNESCAP and ADB. These documents can be utilized for the capacity development training in AMS. To formulate training Programmes, it would be better to transfer the responsibility to respective governments (in-charge of transport logistics), to prepare and plan the Programme for the implementation. Such training will benefit logistics association, managers of logistics companies (Truck, Warehousing, Forwarding and etc.), and operating staff of logistics companies.

3.5.3 LOGISTICS AND MULTI-MODAL TRANSPORTATION

(1) Logistics Services

Within ASEAN, a change in direction has been undertaken from the history of export-oriented industrialization in favour of greater development of maritime transport, with the move toward containerization also having been advanced. Likewise, the conventional production systems within the ASEAN region were characterized by the concluding of all phases of production within single countries, a reflection of underdeveloped infrastructure building, high tariffs and other contributing factors. From here on, however, the integration of production bases, like that seen by automobile manufacturers and the consumer electronics industry with the start up of the ASEAN Free Trade Area (AFTA), will fuel a shift to the format of concentrating production in single locations within ASEAN, with completed products exported to destinations around the world. In fact, the establishment of such an international division of labour system is already underway. Powered by such changes in production systems, logistics within the ASEAN region will experience the ongoing advancement of production base integration and the move toward international labour specialization. This trend will generate the need for introduction of supply chain management (SCM) and the formation of other effective production and sales systems. Against such a backdrop, the need for combined inter-modal transport within ASEAN will continue to grow.

With regard to such "combined intermodal transport," the following definitions have been coined.

- Shipping that extends across two or more countries.
- Combinations of two or more transport modes.
- Transport based on integrated responsibility.
- Application of integrated freight charges.

- Issue of inter-modal transport bills (or through bills of lading).

1) Strategic Logistics Centres

Generally speaking, the functions of logistics centres may be categorized into those that pertain to storage, transhipment, sorting, distribution processing, delivery and information. Nevertheless, under conditions in which the surrounding environments pertaining to traffic and logistics have not been adequately developed within the ASEAN region, the functions of logistics centres have tended to concentrate largely on storage.

From here on, to ensure that the promotion of logistical streamlining within ASEAN succeeds in cutting distribution costs in the region, it will be necessary to achieve essential full-scale logistics centre functions capable of reducing lead time and furnishing seamless and efficient supply chain services.

Table 3-5-4 Logistics Centre Categories

Category	Functions
Multifunction logistics centre	Although no clear definition exists, such centres possess hub functions encompassing traffic and distribution, and effectively integrate delivery centre, dry port and truck terminal functions. Information and communication technology (ICT) functions are mobilized for operation, with centres supplying SCM services and other added value.
Delivery centre	Handling of efficient delivery operations from long- to short-distance transport. Also performs repacking and assembly work.
Dry port	Located some distance from ports and equipped with customs clearance, temporary warehouses and other related facilities.
Truck terminal	Facility with only truck-to-truck transhipment function for products not requiring added value.

2) ASEAN Single Window (ASW)

In the interest of forming “single markets and production bases” in the AEC, at an ASEAN summit meeting convened in October 2003 a task force was launched to promote the ASEAN Single Window (ASW) concept as an ASEAN-wide undertaking. In gearing up for transport facilitation, furthermore, the utilization of ICT is also included among the targets.

Within the approach of logistical streamlining in moving to form the AEC, the ASW system is envisioned to play an instrumental role in accelerating customs procedures. ASW is a scheme contained within the approach of logistical streamlining accompanying formation of AEC, under which applications and approval/ authorization procedures straddling a number of different administrative agencies upon importing or exporting are submitted collectively using an electronic declaration form, with approval received on a lump basis. Essentially, therefore, this is a one-stop service for customs procedures.

In more specific terms, ASW is a system based on the operation and integration of the National Single Windows (NSW) of the AMSs. It is believed that ASW will realize the following three functions.

- Single submission of data and information.
- Single and synchronized processing of data and information.
- Single decision-making for customs release and cargo clearance.

3) Cross-Border Single-Stop Inspection (SSI)/ Single-Window Inspection (SWI)

AMSSs effort to better facilitate and streamline logistics within the ASEAN region to free up procedures at cross-border areas. The related infrastructure development is vital to facilitate

cross-border logistics movement. However, due largely to the lagging progress in constructing infrastructure in AMS, the current status of these efforts may be summarized as follows.

- In Singapore, Malaysia, Thailand and Viet Nam, simplification across the entire sphere of procedures is comparatively advanced. With the exception of Viet Nam, the time demanded for customs clearance ranges from several hours to no more than one day.
- In Myanmar and Laos, the procedures remain complicated due to the need to demonstrate export track records at the border customs houses of these countries, with customs clearance requiring two days or more.
- In Laos as well, with the exception of transit shipments routed through third nations, procedures are concluded at the border alone. With regard to the neighbouring countries of Thailand and Viet Nam, it is possible to enter in vehicles.
- Although Singapore commercial vehicles are not permitted to enter Malaysia, Malaysian vehicles are sanctioned to operate in Singapore. This eliminates the need to repack cargo loads if the vehicle is Malaysian.
- In terms of cross-border railway, there are existing links between the China and Viet Nam and between Thailand and Malaysia with bilateral agreement. A new train service operating from Bangkok in Thailand to Thanalaeng in Lao PDR opened in March 2009.⁵

To reduce logistical costs within ASEAN at cross-border areas in order to facilitate more streamlined logistics and transport, as well as reduce lead time and supply seamless and efficient supply chain services, it will be vital to introduce SSI/ SWI schemes under which both countries are able to conduct export and import procedures one time at single locations. In order to particularly succeed in reducing customs clearance time in cross-border transport involving vehicle transport from here on, approaches are being advanced in which both countries cooperate at the borders to introduce SSI/ SW customs procedures, under which import and export procedures are conducted one time at a single location.

In reality, there is only one location where such customs clearance is being carried out at a cross-border point on the roads (Lao Bao in Viet Nam/Densavanh in Laos) with that operation underway at Stage 1 of the four stages of implementation in addition to cross-borderer railways. Accordingly, the “ideal” situation of transport through simplified cross-border transit (customs procedures) and vehicle transport without any need for repacking has yet to be realized. From here on, efforts will be made not only to make the transition to the customs clearance procedures needed to implement SSI/SWI and resolve other system-based issues pertaining to the cross-border mode, but also simultaneously convert to electronic handling of customs clearance procedures to shorten the lead-time for the overall procedural flow.

⁵ Connecting greater Mekong subregion railways a strategic framework , ADB August 2010

Table 3-5-5 Steps Toward Single Stop and Single Window

Stage	Procedural Details
Stage 1	Export and import country customs offices jointly conduct cargo inspections in import side bonded area. Customs clearance document screening, quarantine and emigration/immigration control carried out by both exporting and importing countries.
Stage 2	In addition to cargo inspections, arrangements also made to conduct document screening at a single location (transition to the customs office Single Window scheme). At this stage, emigration/immigration control conducted by both exporting and importing countries.
Stage 3	Animal and plant quarantines implemented jointly (transition to quarantine Single Window scheme). Emigration/immigration control conducted by both exporting and importing countries.
Stage 4	Integration of emigration/immigration control, implementing Single Stop/Single Window customs clearance.

Source: ASEAN Logistics Network Map 2nd edition, based on deliberations with Asian Development Bank, and region-specific training country reports on August 2007.

4) Advanced Application of Logistics

The Information and Communication Technology (ICT) is one of advanced application for the transport facilitation sector requires the improvement of efficiency, quality service and enhancement security for logistics field. It should coordinate logistical materials, cargo and position information utilizing electronic tags, GPS and other means to promote greater EDI and efficiency in trade procedure. The practical realization of advanced application will be expected improvement customs clearance and related information, greater supply chain efficiency, the perspective of enhanced security, and the streamlining of repacking operations during border customs clearance.

The status of ICT Application in logistics as of 2007 for AMSs vary. At that time, only Singapore and Malaysia have developed paperless customs clearance. Even though the Cambodia, Philippines (partially introduced) and Viet Nam did not introduce EDI system, they have introduced Automated System for Customs Data (ASYCUDA), a computerized customs management system which covers most foreign trade procedures, developed by UNCTAD. According to UNCTAD, Lao PDR government signed ASYCUDA project document on February 2010⁶. In the questionnaire on the Study⁷, Brunei Darussalam answered that E-customs and E-port will be integrated in second quarter 2010, in the questionnaire conducted on February 2010 and Indonesia answered that her integrated portal for ship and port services, namely Inaportnet.

3.6 SUMMARY

The following paragraph summarizes the current status by each transport sector.

Land Transport

Sustaining and supporting the rapid economic and social development in the ASEAN region presents a range of complex challenges for the land transport system. Providing the capacity to accommodate vastly increased vehicles especially 2-3 wheelers, freight volumes and meet the personal mobility needs of burgeoning urban populations is in itself a daunting task. Considering that currently railways and inland waterways have a very limited role in ASEAN region, it is likely that the road sector will continue its dominance in the forthcoming years. With such trend, it is vital to improve the quality of roads and road infrastructure in AMSs.

⁶ ASYCUDA Website by UNCTAD, as of April 26, 2010

⁷ Answer from a questionnaire distributed in EG meeting on February 2010

However, taking into account of various advantages of inland waterways and railways specially related to climatic and environmental benefits, efforts are required to improve their share in ASEAN countries. The initiation of SKRL project is a first step to promote railways in ASEAN region. Such efforts need to be promoted and continued. As railways promotion needs a huge investment and considering the economic capacity of AMSs, it will also be wise to initiate efforts in parallel to improve and promote public transport (Bus Rapid Transport) to decongest and reduce accidents in the selected metro or capital cities in AMSs. The efforts are required to utilize the immense potential of existing Inland waterways in AMSs.

Air Transport

The air transport sector, through the proposed ASEAN Single Aviation Market (ASAM), and addressing problems and elements related to Open Sky Policy will support the establishment of the ASEAN Economic Community (AEC) by 2015. Currently, the rapid air transport traffic volume in ASEAN region is supported mainly by LCCs such as AirAsia, Jetstar and etc. With the emergence of high demand trend in air traffic volume, some of AMSs are developing airports and facilities such as terminal buildings and runways. The open sky policy creates opportunities which promote a competitive environmental in the air transport sector and activates inter- and intra-region trade.

However, harmonized and integrated ASEAN should not only be convenience-oriented, but should also consider coordinated security, safety and environmental issues which are essential prerequisites in improving the overall performance of air transport sector.

In the light of the terrorist attacks on civil aircraft in the United States on 11 September 2001, enhancement measures including aviation screening have been advanced worldwide to strengthen the counter-terrorism capabilities in the air transport sector. After said attack, air transport sector particularly the aviation security continued to tackle countermeasures against such terrorism but still such act further occurred in the world. Need is to introduce more advanced technologies in the aviation safety sector in AMS. Such new technologies will be able to enhance reliability, efficiency, alleviation of congestion and quality of air safety field such as CNS/ ATM services. An environmental measure is currently a global issue and air transport sector must consider, including reduction of carbon (GHG) emission. Privatization of infrastructure is the concern of respective government including the air transport sector. Development and operation of airports under the private sector needs to pay attention to the future prospects and trends.

Maritime Transport

Cargo throughput of AMS has steadily increased, and considering the economic growth, it is expected to continuously increase in forthcoming years too. This increasing cargo demand in the future needs to be addressed. Hence, aside from port development/expansion through introduction of advanced technology and establishment of new shipping route, enhancement of port productivity through privatisation and liberalisation are also required.

Preservation of environment is a global issue which needs to be given prime importance. Though, from the viewpoint of carbon (CO₂) emission, maritime transportation is an environmentally-friendly transport in comparison to other transportation mode, still there is a scope to make it more energy efficient. Effective measures are required to accommodate international standard and execute them in cooperation with international organization, i.e., IMO.

Keeping safety and security are also fundamental matters for navigation. However, the number of accidents and lives lost in Asian waters including Malacca Strait was the worst in the world waters in 2008. Hence, improvement of safety and security will be a priority issue

and for further improvement, this will require the human resource development and introduction of advanced ICT in maritime transport sector.

Transport Facilitation

The three transport facilitation agreements namely, ASEAN Framework Agreement on the Facilitation on Goods in Transit, Multimodal Transport and Inter-state Transport plays and will play a major role in future too in facilitating transport in ASEAN region. Despite the accelerated process especially in last few years, still not all agreements and protocols have been ratified by AMS. The TTCB and NTTCCs are responsible for the overall coordination and implementation of these frameworks agreements and as a first step, the NTTCC's has been established in all AMS. The other Programmes such as ASEAN-EU Programme and Australia Development Cooperation Programme (AADCP) are also supporting in implementing these framework agreements.

Today, logistics industry includes approximately 40,000 forwarding and logistics personnel and to improve trade and transport performance in ASEAN region, it is vital to improve the skills, knowledge, and competencies of the personnel involved. In this regard, national training centres have been established in few AMS and capacity building Programme are ongoing. It is to be noted that capacity building Programmes have just been initiated and need to be continued for effective results. Japan under the A-J TLIP Programme is active in supporting and implementing the capacity development Programmes for transport logistics in AMS.

The preparations for the establishment of ASEAN Single Window by 2010 are not proceeding as planned and specific efforts are required to meet the said target year. However, the National Single Window (NSW) systems have been established in few AMS. In terms of customs clearance facilitation, till date only one cross border point (Lao PDR –Viet Nam) was able to reach to stage-1 (out of total 4 stages) in addition to railway linkages. The efforts are need to be accelerated to improve trade and transport logistics in ASEAN region.