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Working Paper

Infrastructure development for ASEAN economic integration

ADB Working Paper, No. 138

Provided in Cooperation with:

Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Bhattacharyay, Biswa Nath (2009) : Infrastructure development for ASEAN economic integration, ADB Working Paper, No. 138, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:

<https://hdl.handle.net/10419/53721>

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ADB Working Paper Series

**Infrastructure Development for
ASEAN Economic Integration**

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No. 138
May 2009

Asian Development Bank Institute

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Suggested citation:

Bhattacharyay, B. N. 2009. Infrastructure Development for ASEAN Economic Integration. ADBI Working Paper 138. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2009/05/27/3011.infrastructure.dev.asean.economic/>

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Abstract

With a population of 600 million, ASEAN is considered to be one of the most diverse regions in the world. It is also one of the world's fastest growing regions. ASEAN's aim is to evolve into an integrated economic community by 2015. Crucial to achieving this ambitious target is cooperation in infrastructure development for physical connectivity, particularly in cross-border infrastructure. This paper provides an overview of the quantity and quality of existing infrastructure in ASEAN member countries, as well as ASEAN initiatives in cross-border infrastructure development in the energy, transportation and communication sectors. It examines the role of, and need for, infrastructure development towards an integrated ASEAN, and discusses associated issues and challenges. This paper also provides estimates of ASEAN infrastructure financing requirements up to 2015, and identifies ways to meet this demand, especially in view of the current global economic crisis. The paper concludes with a discussion on the need to enhance ASEAN infrastructure cooperation towards achieving the ultimate vision of Asia-wide connectivity and integration.

JEL Classification: F1, F4, R11, R50

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1. INTRODUCTION¹

The Association of Southeast Asian Nations (ASEAN) is composed of Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam. It was formed in 1967 with multiple goals— accelerating economic growth, social progress, and cultural development in the region. It also aims to promote regional peace and stability through abiding respect for justice and the rule of law, under the principles of the United Nations Charter.

In 1992, the ASEAN Free Trade Area (AFTA) was established to eliminate tariff barriers among Southeast Asian nations, with a view to integrating the ASEAN economies into a single production base, and creating a regional market of half a billion people (ASEAN 2002). The ASEAN Vision 2020 adopted in 1997, envisions ASEAN as a group of nations, “outward looking, living in peace, stability and prosperity, bonded together in partnership in dynamic development and in a community of caring societies.” Its goal is to change ASEAN into a stable, prosperous, and highly competitive region, with equitable economic development, and reduced poverty and socio-economic disparities (ASEAN 2008c). In 2003, the ASEAN Economic Community (AEC) was declared as one of the main pillars of the ASEAN Community. The AEC will be the realization of efforts by ASEAN member countries to strengthen economic integration, through existing and new initiatives with clear timelines.

At the 13th ASEAN Summit held on 20 November 2007, ASEAN leaders signed the ASEAN Economic Community Blueprint to fast-track AEC establishment by 2015. The Blueprint envisions ASEAN as a highly competitive region, fully integrated into the global economy, possessing a single market production base, and characterized by equitable economic development (Goh Ching Yin 2008). Moreover, the Roadmap on Integration for ASEAN in Finance (ASEAN 2009b) further identifies four goals for financial integration in the region, namely: (i) to develop deep financial markets and achieve cross-border collaboration among ASEAN capital markets; (ii) to have free flow of financial services; (iii) to improve the flow of capital; and (iv) to have closer currency cooperation.

Infrastructure development is essential to the realization of ASEAN’s goal of economic integration, and indispensable to ASEAN’s future success—particularly if the region is to weather the fallout from the ongoing global economic crisis. Now more than ever, the development of infrastructure needs to be accelerated to enhance physical connectivity, as well as encourage resource-sharing. To promote cross-border trade and investment, improve countries competitiveness, and raise domestic output, it is important for ASEAN countries to be physically connected through various modes of transportation, such as roads, railways, airways, and ports and shipping. An improved and integrated transport and logistics systems in ASEAN is an integral part of the regional integration initiative.

This paper discusses the role of infrastructure development in ASEAN economic integration and its associated issues and challenges. Following this brief introduction, Section 2 presents the role of regional infrastructure cooperation in ASEAN’s growth and integration. Section 3 provides an overview of ASEAN infrastructure in terms of its quality and quantity, and its importance for enhancing growth, trade, and investment; reducing the development gap; providing adequate basic needs; and achieving poverty reduction. Section 4 examines issues and challenges in infrastructure development. Section 5 addresses infrastructure financing requirements, while Section 6 discusses the role of multilateral development banks (MDB). Section 7 concludes.

¹ An earlier version of the paper was presented at the conference on “ASEAN Roundtable 2008: ASEAN Economic Community Blueprint” in Singapore on 28 July 2008. The author thanks Prabir De for useful comments and Marie Danielle Guillen for assistance in the preparation of the paper.

2. THE ROLE OF REGIONAL INFRASTRUCTURE COOPERATION IN ECONOMIC GROWTH AND INTEGRATION

2.1 Defining Infrastructure

Infrastructure plays an important role in promoting rapid economic growth and making this growth more inclusive, by sharing the benefits of growth with poorer groups and communities, particularly in remote and isolated areas and small and landlocked countries. Infrastructure facilitates the poor's access to basic services and helps increase their income generating capacity. Physical connectivity through cross-border infrastructure (CBI) development is crucial for enhanced regional cooperation and economic integration (Kuroda 2006).

Infrastructure can mean many things to different people. The American Heritage Dictionary defines the term as the basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power. Infrastructure typically refers to the technical structures that support a society and economy, such as transportation, water supply, wastewater treatment facilities, power grids, flood management systems, and communications (internet, phone lines, and broadcasting).

In economic terms, however, infrastructure can be seen as a structure which allows for the production and exchange of goods and services. Broadly defined, the concept of infrastructure is not limited to public utilities, but may also refer to information technology, informal and formal channels of communication, software development tools, and political and social networks which support the economic system (such as a city or a country). It also encompasses the soft aspects of infrastructure such as operating procedures, management practices, and development policies that interact with societal demand and the physical world to facilitate the transport of people and goods, and the provision of safe water and energy, among others (National Research Council 1987).

Infrastructure can be categorized into hard infrastructure and soft infrastructure. The former refers to physical structures or facilities that support the society and economy, such as transport (e.g., ports, roads, railways); energy (e.g., electricity generation electrical grids, gas and oil pipelines); telecommunications (e.g., telephone and internet); and basic utilities (e.g., drinking water supply, hospitals and health clinics, schools, irrigation, etc.). The latter refers to non-tangibles supporting the development and operation of hard infrastructure, such as policy, regulatory, and institutional frameworks; governance mechanisms; systems and procedures; social networks; and transparency and accountability of financing and procurement systems (Bhattacharyay 2008).

Cross-border or regional infrastructure may be defined as infrastructure that connects two or more countries, as well as national infrastructure that has significant cross-border impact. Therefore, a large portion of national infrastructure, such as airports, ports, roads, and railways, can be considered as CBI. In other words, national infrastructure connectivity or integration is the building block for cross-border or regional connectivity.

2.2 Infrastructure and its Linkages to Economic Growth and Development

Infrastructure spending accounts for a significant proportion of national income and consumption in many countries; as such, any reform affecting the sector is likely to have wider repercussions on the economy. Empirical evidence indicates that infrastructure spending has a positive and statistically significant effect on long-run economic growth

(World Bank 2002). Ghosh and De (2005), for instance, have noted that infrastructure in least developed countries contributed towards a hinterland's output, income, employment growth and quality of life. Meanwhile, Esfahani and Ramirez (2003) have found that if Africa had East Asia's growth rate in telephones per capita (10% vs 5%) and in electricity generation (6% vs 2%), its per capita growth rate would have been at least 0.9% higher. Richards (2008) has shown that due to the lack of adequate investment in infrastructure during the 1990s, Latin America's long-term growth was lower by 1 to 3 %. Because infrastructure service provides valuable inputs to other commercial activities, the removal of infrastructure bottlenecks contributes to overall growth. In East Asia, recent studies have indicated that greater stocks of infrastructure were indeed associated with higher growth (Seethepalli et al. 2008).

Many studies also emphasize the role of infrastructure in facilitating trade. East Asia is noted to have achieved high integration in trade, mostly through trade in parts and components. Many countries in the region are involved at different stages in the assembly process. In fact, Fujita (2005) has noted that East Asia's highly integrated manufacturing system has allowed the region to play an "export platform" in the global economy. A study on the determinants of FDI inflows in Malaysia has revealed that the provision of an adequate infrastructure base stimulates FDI inflows (Ang 2008). However, these systems are still evolving and will come under increasing pressure, as production concentration and other economic activities expand inland, due to rising costs in coastal areas.

Other empirical studies have highlighted the importance of infrastructure in promoting growth and reducing poverty. A UNESCAP (2006) study on infrastructure in developing Asian countries has shown that road transport and electricity, in particular, play a key role in poverty reduction. Similarly, a study on road infrastructure in the Philippines has found that rural roads generate the largest impact in terms of income growth. The same study revealed that rural household's production and income-generation potential is optimized with access to networks that alleviate their isolation (Barrios 2008).

Bhattacharyay (2008) has identified a number of major roles for infrastructure in regional socio-economic development and integration. First, basic infrastructure promotes economic exchange among various sectors of an economy, both locally and internationally. It provides greater access to key inputs for economic growth, such as resources, technology, and knowledge. Second, infrastructure improves socio-economic and environmental conditions by providing basic needs and utilities such as roads, water, sanitation, hospitals, clinics, schools, environment-friendly power, and telephone lines—all of which are part of the United Nation's Millennium Development Goals (MDGs). It can reduce: (i) non-income poverty by facilitating the poor's access to basic services; and (ii) income poverty by increasing economic opportunities and income generating capacity, particularly for poorer groups and communities in remote areas. Third, it enhances physical connectivity both within and among countries, facilitating the movement of goods and services. Soft infrastructure—such as modern technology and improved customs procedures and trade rules and regulations—improves logistics, resulting in reduced trade costs and the speedier movement of goods and services. Fourth, greater regional integration through enhanced physical connectivity supports trade and investment (including FDI) expansion, and financial market development.

CBI provides economies with greater access to regional and global markets. It promotes efficient production, trade competitiveness, and trade flows, by allowing businesses to join the regional production network and supply chains. This gives small, landlocked, low-income economies the opportunity to narrow their development gap with richer ones. Finally, CBI allows regional economies to share scarce regional resources such as energy, capital, and services.

2.3 The Importance of Infrastructure in ASEAN Development and Regional Integration

An important area of ASEAN cooperation is binding ASEAN countries closer through efficient infrastructural linkages in transportation, telecommunications, and energy (Ong Keng Yong 2004). Achieving regional infrastructure integration is one of ASEAN's most challenging tasks, given the region's geographic, size and economic diversity. The challenges notwithstanding, developing CBI should be one of ASEAN's primary goals.

The ongoing global economic crisis has had an adverse impact on the economic growth and export performance of ASEAN countries, as export demand in advanced economies has decreased. As such, regional demand needs to be enhanced through increased intra-regional trade, to compensate for the fall in export demand in advanced economies. In this difficult time, CBI can play an important role in strengthening regional physical connectivity to promote intra-regional trade.

Economic integration in East Asia, and most ASEAN countries has been primarily market-driven (bottom-up approach) , through trade and FDI; however, integration has reached a critical stage where further advances will require the development of a region-wide political institution (Fujita 2005; Kawai 2004). In recent years, East Asian countries have been working to establish more government-level agreements, to enforce de facto market-driven integration founded on common production bases across the region (Watanabe 2006). A top-down government-led and market-creating approach will be appropriate at this stage. A similar "multi-track and multi-speed approach" should be used for ASEAN infrastructure integration (Kuroda 2006).

To build up infrastructure, ASEAN members should utilize their own national resources, as well as tap those of other Asian countries. The role of ASEAN, then, is to ensure cooperation and coordination of its members' infrastructure projects (ASEAN 2008a); harness shared resources, such as capital, energy, services and technology; harmonize cross-border rules and regulations; and facilitate exchange of good practices on institutions and policies. Such cooperation can potentially follow a two-track approach, namely: (i) cooperation in building and operating CBI; and (ii) cooperation in financing infrastructure development. Enhancing ASEAN connectivity through CBI requires strong commitment and partnership among ASEAN governments.

3. INFRASTRUCTURE DEVELOPMENT IN ASEAN: AN OVERVIEW

3.1 The Importance of Infrastructure in ASEAN Economic Growth, Poverty Reduction, and Trade Integration

There are four main reasons why infrastructure development needs to be accelerated in ASEAN.

First, infrastructure plays a significant role in promoting and sustaining economic growth in the region. As seen in Table 1, real GDP growth in ASEAN averaged 5.4% in 2000-2007, way above the world average of 4.1%. Real GDP growth in developing Asia is expected to slow in view of the ongoing global financial crisis, although it is still projected to exceed the world average.

Table 1: Real GDP Growth of ASEAN, Developing Asia and the World

Country	Average Growth ^a		Projected Growth ^b		
	1990–99	2000–2007	2008	2009	2010
Brunei Darussalam	2.1	2.3	-2.7	-0.4	2.3
Cambodia	..	9.5	6.5	2.5	4.0
Indonesia	4.1	5.1	6.1	3.6	5.0
Lao PDR	6.4	6.6	7.2	5.5	5.7
Malaysia	7.1	5.6	4.6	-0.2	4.4
Myanmar	6.0	12.0	2.0 ^a	6.0 ^a	4.0 ^a
Philippines	2.8	5.1	4.6	2.5	3.5
Singapore	7.5	6.0	1.1	-5.0	3.5
Thailand	5.1	5.0	2.6	-2.0	3.5
Vietnam	7.4	7.6	6.2	-2.0	3.0
ASEAN-5	4.6	5.4	4.3	0.7	4.2
World	2.9	4.1	3.9 ^a	3.0 ^a	4.2 ^a
Developing Asia	7.2	8.1	6.3	3.4	6.0

Note: Developing Asia composed of 23 countries which includes ASEAN 5 (Indonesia, Malaysia, Philippines, Singapore, and Thailand), India, PRC and 16 other Asian countries.²

Sources: ^aIMF World Economic Outlook October 2008b; ^bADB Asian Development Outlook 2009b.

ASEAN- 5 is estimated to have grown by 4.3% in 2008; growth in 2009 is projected to be significantly lower at 0.7%, but recovery is expected in 2010 (ADB 2009b). The global economic crisis has hit export-oriented ASEAN countries the hardest. A recession is imminent in both Singapore and Thailand, while growth in Malaysia is expected to be minimal (World Bank 2009). This reduction in growth could negatively affect investments in infrastructure, precisely at a time when they are needed the most. Accelerating infrastructure development at this juncture will be critical not only to address current shortfalls, but also to cushion the impact of the global financial and economic crisis on economic growth in the region.

While ASEAN has enjoyed impressive growth in the last decade, this growth has also created huge pressures on its infrastructure stock. A large imbalance in basic infrastructure exists among ASEAN member countries (Table 2). For instance, only 5% of the population in Myanmar has access to electricity, compared to 80% in Indonesia. Cambodia, Indonesia and Viet Nam trail other countries in the region in terms of access to sanitation infrastructure. The number of telephone subscribers is also quite low in Cambodia and Myanmar.

**Table 2: Infrastructure Access Indicators in Selected ASEAN Member Countries
(% of total population)**

Infrastructure	Cambodia	Indonesia	Myanmar	Viet Nam
Electricity	10.0	80.0	5.0	60.0
Water	34.0	78.0	80.0	73.0
Sanitation	16.0	52.0	73.0	41.0
Teledensity	38.0	127.0	8.0	88.0
Road Density (population)	1.0	1.7	-	1.2
Road Density (area)	70.0	203.0	-	287.0

Notes: Electricity: Access to electricity network; Water: access to improved water sources; Sanitation: access to improved sanitation; Teledensity: telephone subscribers per thousand population; Road density (population): road km/ 1,000 people; Road density (area): road km/ 1,000sq.km; -- where data is not available

Source: Estache and Goicoechea 2005.

² Bangladesh, Bhutan, Cambodia, Fiji, Kiribati, Lao People's Democratic Republic, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Samoa, Solomon Islands, Sri Lanka, Tonga, Vanuatu, and Viet Nam.

Second, infrastructure development is necessary to accelerate economic integration within the region, particularly in the area of trade and investment. ASEAN countries have unanimously pledged to maintain open market principles, and this is unlikely to be reversed. The pattern of ASEAN regional cooperation and integration indicates that integration has been largely market-driven. Large trade and FDI flows have been spurred by outward-oriented policies and infrastructure, as well as other factors such as financial integration, and the formation of production networks and supply chains by global multi-national corporations (MNCs) and Asian firms.

Infrastructure development is crucial for sustaining and enhancing trade both within and outside ASEAN. More than 50% of Asia's exports are intra-regional, and the expansion of PRC and India is expected to boost intra-regional trade further. In ASEAN, Malaysia, Singapore and Thailand have built well-developed logistics systems to facilitate intra-regional and international trade (Brooks 2008)

As shown in Table 3, trade integration in ASEAN has been stagnant since 1995. Its level of intraregional trade is much lower than NAFTA's and EU's; hence, the potential for trade enhancement is significant. High trade and logistics costs have been major contributing factors to this stagnation. These, in turn, have been caused by the poor quality of hard infrastructure as well soft infrastructure, such as market-unfriendly legal or regulatory frameworks, and cumbersome customs and cross-border systems and procedures.

Table 3: Interregional Trade Share by Region, 1980–2005
(percent of total trade)

Region	1980	1985	1990	1995	2000	2005
East Asia (including Japan)	34.6	37.1	43.0	51.7	51.9	54.5
Emerging East Asia	22.1	27.5	32.8	39.0	40.4	44.7
Asian NIEs	6.4	6.5	11.9	15.5	15.5	13.5
ASEAN	17.9	20.3	18.8	23.9	24.5	24.0
NAFTA	33.8	38.7	37.9	43.1	48.8	45.0
European Union-15	60.7	59.8	66.2	64.2	62.3	60.1

Note: East Asia= Japan and emerging East Asia; Emerging East Asia=Asian NIEs and ASEAN; Asian NIEs=newly industrialized economies; ASEAN=Association of Southeast Asian Nations; NAFTA=North American Free Trade Agreement

Source: Kawai 2007

Providing an efficient logistical system will be essential as economies in the region move progressively into more complex and higher-value manufacturing and fragmented production. Improving logistics will also be important as manufacturing firms move further inland from locations near ports and coasts, owing to congestion and other factors (Kuroda 2006). The bottlenecks at Asia's borders often hinder the efficiency of its logistics systems (Table 4). As noted in the ASEAN Transport Action plan 2005–2010, logistical concerns include the lack of quality road transport to ports, poor port infrastructure, and sub-optimal shipping networks add to overall transport costs. The absence of regional logistics players perpetuates the fragmented transport system in the region. Therefore, the potential to enhance integration through improved regional infrastructure (both hardware and software) is big.

Table 4: Comparative logistics indicators in selected ASEAN countries, 2008

Country	Customs clearance (days)	Lead time export, median case (days)	Lead time import, median case (days)	Typical charge for 40-foot export container or a semi-trailer (US \$)	Typical charge for a 40-foot import container or a semi-trailer (US \$)
Cambodia	1.00	2.71	3.29	334.72	421.72
Indonesia	1.58	2.54	3.88	266.00	388.34
Malaysia	1.68	3.44	3.31	784.54	244.44
Myanmar	4.48	2.65	3.16	150.00	150.00
Philippines	1.82	6.35	5.31	721.12	793.70
Thailand	1.92	3.39	2.29	421.72	421.72
Viet Nam	1.45	2.77	3.95	193.65	293.7

Note: Custom clearance (days) = time taken between the submission of an accepted customs declaration and customs clearance; lead time export, median case (days)= from the shipper to port of loading, median case=50% of shipments; Typical charge for a 40-foot export container or a semi-trailer (US \$)=total cost to transport and port service; Typical charge for a 40-foot import container or a semi-trailer (US \$)=total cost to transport and port service.

Source: World Bank online database on Logistics Performance Index (LPI), 2008a

In particular, CBI can help reinvigorate ASEAN economic integration by (i) enhancing resource sharing and efficiency; (ii) building connectivity and enlarge markets; (iii) reducing transportation and trade costs; (iv) establishing linkages with regional and global supply chains; and (v) facilitating further regional economic cooperation and integration through physical connectivity. Of primary importance is improving access to primary services (i.e., electricity and water), and trade-related infrastructure, especially transport and information, communication, and technology (ICT).

Third, addressing inequalities in infrastructure development is critical to the wider objective of reducing development gaps among ASEAN countries; and income inequality and poverty within each country. Table 5 below ranks ASEAN countries in descending order of infrastructure development, based on estimated scores of the infrastructure index for 1991, 2000 and 2005.

Table 5: Ranking of ASEAN Countries According to the Level of Infrastructure Development

Country	1991		2000		2005	
	Index	Rank	Index	Rank	Index	Rank
United States	25.96	1	22.95	1	20.66	1
Japan	16.28	5	18.65	4	18.58	2
Singapore	15.73	6	20.11	2	17.66	3
Malaysia	5.10	37	8.65	27	9.21	29
Thailand	4.17	43	5.48	38	5.89	42
Viet Nam	0.91	92	1.85	75	3.27	61
Indonesia	2.23	69	2.74	63	3.21	62
Philippines	1.53	76	2.58	65	2.95	63
Lao PDR	0.55	99	1.19	84	0.87	92
Myanmar	0.97	90	0.79	91	0.76	95
Cambodia	0.45	100	0.66	93	0.55	98

Note:

Index= Research and Information System for Developing Countries Infrastructure Index (RII) where $RII_{it} = RIS$ Infrastructure Index of the i -th country (104 countries) in t -th time (namely, 1991, 2000, 2005), W_{jt} =weight of the j -th aspect of infrastructure in t -th time, and X_{ijt} =value of the j -th aspect of infrastructure for the i -th country in the t -th time point. Each of the infrastructure variables is normalized for the size of the economy so that it is not affected by the scale. The W_{jt} are estimated with the help of principal component analysis (PCA). The aspects of infrastructure covered in the construction of the composite index are transport infrastructure, ICT infrastructure, Energy infrastructure and Financial Infrastructure. Detailed explanation is in Kumar and De (2008)

While the trend from 1991 to 2005 shows an improvement in the ranking of each country, it also reveals huge gaps in infrastructure availability across ASEAN member countries. These gaps also seem to have widened, rather than narrowed, over time.

Similarly, a widening gap is also evident in land transport. Over 15 year period, roads have improved in most countries, but in terms of rail lines, very minimal improvement can be observed (Table 6). Gaps are also evident in terms of paved roads as a proportion of total roads (6.5% in Cambodia vs. 100% in Singapore in 2005). These gaps in infrastructure development need to be addressed if the development gap—both within and across countries in the region—is to be reduced. Substantial resources will be needed in order to bridge these infrastructure deficits, particularly in low-income ASEAN countries. The main challenge is, therefore, to mobilize regional savings to meet these gaps in low income countries.

Table 6: Land Transport Indicators in ASEAN Countries

Country	Roads, total network (km)			Roads, paved (% of total roads)			Rail lines (total route-km) (per 100km.sq.)		
	1991	2000	2005	1991	2000	2005	1991	2000	2005
Brunei Darussalam	25.82	19.93	20.10	32.00	34.70	78.06	0.00	0.00	0.00
Cambodia	19.76	20.02	21.13	7.50	16.20	6.29	0.33	0.33	0.36
Indonesia	16.48	18.69	19.34	45.30	57.10	58.00	1.90	1.91	1.93
Lao PDR	5.95	9.17	13.18	16.00	44.50	14.41	0.19	0.20	0.21
Malaysia	27.31	19.98	29.94	73.00	75.30	81.32	0.67	0.60	0.60
Myanmar	3.77	4.13	4.13	11.20	11.44	11.44	0.33	0.38	0.38
Philippines	53.57	67.24	66.68	14.00	21.00	21.64	0.16	0.16	0.16
Singapore	423.97	451.62	456.08	97.10	100.00	100.00	0.00	0.00	0.00
Thailand	10.20	11.19	11.19	88.40	98.50	98.50	0.75	0.79	0.79
Viet Nam	29.60	65.49	67.47	23.90	25.10	25.10	0.86	0.95	0.81

Source: World Bank 2008b.

As a result of export-oriented development, productive industrial assets and infrastructure have been concentrated along coastal areas, where access to the world market has been well provided. To reduce income disparities within a country, infrastructure should be extended into remote inland areas which have traditionally been neglected. The opening of frontier borders will allow such areas to take part in mainstream national development. Meanwhile, CBI can help reduce inequalities across the region by providing small, landlocked, low-income countries with access to the larger regional market; linking them to the regional/global production network and supply chain; and supporting the formation of industrial clusters/zones, as can be seen in Lao PDR, Cambodia, Myanmar, and Viet Nam.

Finally, infrastructure development is necessary to improve resource sharing and efficiency in the region to provide basic needs, such as water and electricity. Within the context of addressing ASEAN's energy needs, transporting or exporting energy from energy-surplus to energy-deficient countries could help in achieving energy security. Studies show that the Greater Mekong Sub-region³ could save the region US\$200 billion in total energy costs (roughly 19% of costs) through energy exports. Note that with the exception of Yunnan Province, PRC, all of the GMS countries are also ASEAN member countries. A reduction in costs will bring about significant benefits, particularly for smaller GMS economies such as Lao PDR, with a GDP of US\$3.4 billion; even Thailand, with a GDP of US\$206 billion, is expected to benefit from a reduction in total energy costs. The gains owe to large increases in energy demand over the coming years, uneven resource endowments across the region (GMS 2009).

3.2 Regional Cooperation in ASEAN Cross-Border Infrastructure Development

CBI development in ASEAN is being pursued through (i) ASEAN member countries' own initiative (ii) the initiatives of other sub-regional infrastructure cooperation programs such as the Greater Mekong Subregion (GMS), the Mekong River Commission (MRC), the Brunei-Indonesia-Malaysia-Philippine East Asia Growth Area (BIMP-EAGA) and the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT); and (iii) the pan-Asian initiative like the Asian Highway (AH) and the Trans-Asian railway (TAR) network.

The GMS includes four ASEAN landlocked member countries—Cambodia, Lao PDR, Thailand, and Viet Nam— plus the provinces of Yunnan and Guangxi in PRC. Its major goal

³ GMS countries consist of Cambodia, Lao PDR, Myanmar, Thailand, Viet Nam and Yunnan Province in the People's Republic of China

is integration, and its main functional areas are trade and infrastructure, with a focus on improving connectivity in the subregion by improving transport, energy, and telecommunications. Cooperation in the energy and telecommunications sector began in 1992 with power transmission lines linking Lao PDR and Thailand. In 2001, a 10-year strategic framework was adopted to enhance connectivity, competitiveness, and a sense of community; eleven flagship programs were identified, including three economic corridors: East-West, North-South and Southern (ADB 2005). In 2008, the GMS cross-border transport agreement (CBTA) was signed and ratified. The CBTA is a compact and comprehensive multilateral instrument that covers all the relevant aspects of cross-border facilitation including single-stop/single-window custom inspections; cross-border movement of people; transit traffic regimes; requirements for vehicles making cross-border trips; exchange of commercial traffic rights; and issues related to road and bridge design standards, road signs and signals (ADB 2008).

The MRC is an informal forum established by Cambodia, Lao PDR, Thailand and Viet Nam to manage their shared water resources and sustainably develop the economic potential of the Mekong River basin. Myanmar and PRC are dialogue partners of this forum (MRC 2009).

BIMP-EAGA, composed of Brunei Darussalam and provinces in Indonesia, Malaysia, and the Philippines, is an informal institution where senior officials and ministers of the member countries provide strategic directions and policy guidelines for expanding trade and investment opportunities through infrastructure development. Its regional projects have focused on air and maritime services, as well as software aspects. A memorandum of agreement on promoting cross-border movement of commercial buses and vehicles, and establishing efficient and integrated sea links in the subregion, was signed by the members in 2007 (BIMP-EAGA 2009).

IMT-GT is composed of provinces in three ASEAN member countries: Indonesia, Malaysia, and Thailand, which aim to expand opportunities for trade and investment through improved infrastructure and connectivity. The private sector plays an important role through the joint business councils. There are six working groups, including one focused on infrastructure and transport. To date five economic connectivity corridors have been identified. In partnership with ADB, it provides capacity-building support, helps mobilize technical and financial resources, and helps promote an enabling environment for private sector development (IMT-GT 2009).

The AH network and TAR network are part of the existing pan-Asian infrastructure initiative called the Asian Land Transport Infrastructure Development (ALTID). ALTID was established in 1992 by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The general goal of this initiative is to improve economic links among Asian countries through better and increased connectivity. Its other pillar is the facilitation of land transport projects through intermodal transport terminals (dry and inland ports).

In the case of ASEAN, there are currently four long-term cross-border flagship projects on integrating ASEAN's infrastructure, mainly in the energy and transport sectors:

3.2.1 Energy Sector Projects

The ASEAN 2020 Vision adopted in 1997 at the 2nd ASEAN Informal Summit envisioned an energy-interconnected Southeast Asia through two major energy projects: the ASEAN Power Grid, consisting of 14 interconnection projects, and the Trans-ASEAN Gas Pipeline.

Aside from securing a cross-border energy network, the two major projects are expected to stimulate the ASEAN economy and promote a win-win economic relationship between the countries through energy trading (EGAT 2003). Interconnected electricity networks allow countries with abundant natural resources to generate income from their surplus power, while countries with power shortages can import from neighboring countries at reasonable

prices. Interconnection will reduce national investment in power reserves to meet peak demand, give a more reliable supply of electricity, and increase consumers' access to electricity. ASEAN requires US\$100 billion to meet the increasing electricity demand and US\$ 7 billion for the gas pipelines (Yong 2004).

ASEAN initiatives on energy interconnection date back to the ASEAN Cooperation Project on Interconnection, which started in 1982. This was aimed at linking the power systems of neighboring ASEAN countries. In 1986, ASEAN member countries signed the Agreement on ASEAN Energy Cooperation, calling for cooperation in the efficient development and use of all forms of energy, whether commercial and noncommercial, renewable or nonrenewable. At present, it is estimated that ten ASEAN countries have a total of 22 billion barrels of oil, 227 trillion cubic feet of natural gas, 46 billion tons of coals, 234 gigawatts of hydropower and 20 gigawatts of geothermal capacity (AMEM 2004).

At the 17th ASEAN Energy Minister's Meeting in 1999, the ASEAN Plan of Action for Energy Cooperation (1999–2004) was adopted, with the establishment of the ASEAN Power Grid as one of its major goals (ASEAN 2008a). The ASEAN Center for Energy (ACE) is the central intergovernmental organization responsible for initiating, coordinating and facilitation collective activities on energy.

3.2.1.1 ASEAN Power Grid

Interconnection of the power grid is being implemented through a cooperative agreement among the power utilities/authorities of the ten countries. Agreements are made bilaterally between the countries. To initiate the ASEAN power grid system, the Heads of ASEAN Power Utilities/Authorities (HAPUA) under ACE oversee the implementation of 14 interconnection projects. Two of these have been completed and are currently operating. These are the Peninsular Malaysia-Thailand Interconnection, and the Peninsular Malaysia-Singapore Interconnection. Interconnections have optimized the power systems' production.

Encouraged by its experience with these two projects, ASEAN has identified criteria for future interconnections. In the ASEAN Plan of Action for Energy Cooperation (APAEC) 2004-2009, interconnection between Vietnam-Cambodia is slated for possible commissioning by 2005-2007, Thailand-Cambodia by 2007, Peninsular Malaysia-Sumatra, Sarawak-West Kalimantan, Thailand-Lao PDR by 2009. Future interconnections would include Sarawak-Peninsular Malaysia, Batam-Bintan-Singapore-Johor, Philippines-Sabah, Sarawak-Sabah-Brunei Darussalam, Lao PDR-Viet Nam, Thailand-Myanmar and Lao PDR-Cambodia.

3.2.1.2 Trans-ASEAN Gas Pipeline

In July 1999, the plan of action for the Trans-ASEAN Gas Pipeline (TAGP) was approved as one of ASEAN's most important infrastructure projects. Its objectives are to (i) ensure the reliability of gas supply for ASEAN member countries; (ii) encourage the use of environment-friendly fuel; (iii) attract multinational companies; and (iv) invest in gas exploration and reduce the region's reliance on crude oil (ASEAN 2008b). Gas interconnection is expected to bring affordable and accessible gas to industries, businesses, and households across the whole of ASEAN. In the APAEC 2004-2009, the approved TAGP roadmap includes eight gas interconnections projects: South Sumatra, Indonesia-Peninsular Malaysia; W. Natuna, Indonesia-Duyong, Malaysia (with firm commitments secured); E. Natuna, Indonesia-JDA-Erawan, Thailand 4a and 4b E. Natuna-W. Natuna, Indonesia-Singapore; E. Natuna, Indonesia-Brunei Darussalam-Sabah, Malaysia, Palawan-Luzon, Philippines; Malaysia-Thailand JDA-Block B Viet Nam; Pauh, Malaysia-Arun, Sumatra, Indonesia and East Kalimantan-Sabah-Philippines.

3.2.2 Transport Sector Projects

Since 1998, ASEAN member countries have completed nine regional transport agreements. These include the mutual recognition of commercial vehicle inspection certificates; ASEAN highway network development; goods in transit facilitation and its five implementing Protocols; and air freight services liberalization. In October 2003, at the 9th ASEAN Transport Ministers (ATM) Meeting in Yangon, Myanmar, the Ministers agreed to intensify regional activities to enhance multimodal transport linkages and interconnectivity; promote the seamless movement of peoples and goods; encourage further liberalization in the air and maritime transport services; and improve the integration and efficiency of transport services and supporting logistic systems.

ASEAN's major projects in transport are the ASEAN Highway Network and the Singapore-Kunming Rail Link Projects.

3.2.2.1 ASEAN Highway Network Project

The ASEAN Highway Network Project was signed in 1999. The network consists of 23 designated routes totaling 38,400km. The project aims to upgrade all designated national routes to Class I standards by 2020, although Class II standards would be acceptable for low-traffic, non-arterial routes. The ASEAN Transport Sectoral Action Plan 2005–2010 identifies priority road infrastructure projects for the ASEAN Highway which include the Mawlamyazine-Thabyuzayat section in Myanmar; the Attapeu-Phia Fai section in Lao PDR; and the Quang Ngai-Kon Tum section in Vietnam.

3.2.2.2 Singapore-Kunming Rail Link (SKRL) Project

The Singapore-Kunming Rail Link (SKRL) Project is being implemented under the ASEAN Mekong Basin Development Cooperation initiative. The 7,000km railway line is expected to link major cities in eight countries, namely Singapore, Malaysia, Thailand, Cambodia, Viet Nam, Lao PDR, Myanmar, and the PRC (ASEAN 2008a). In the ASEAN Transport Sectoral Action Plan 2005–2010, the priority sections are as follows: the Poipet-Sisophon Railway Link Project (Cambodia); the Ho Chi Minh City-Loc Ninh Railway Link Project (Viet Nam); and the Spur Lines between Three Pagoda Pass and Thanbyuzayat (Myanmar) and Vientiane-Mua Gia-Tan Ap-Vun Ang (Lao PDR/Viet Nam).

Apart from these major projects, other transport initiatives to integrate member countries' transport systems have been adopted. These include the framework agreement on the facilitation of goods in transit; the ASEAN Framework Agreement on Multimodal Transport; and the ASEAN Framework Agreement on the Facilitation of Inter-State Transport. Member countries have also designated 51 airports and 46 ports to form integral parts of the trans-ASEAN transportation network.

3.2.3 Telecommunications and IT Projects

ASEAN is working on cooperative programmes in telecommunications and information technology (IT) through the implementation of the e-ASEAN Agreement, specifically in the following areas: (i) developing ASEAN's information infrastructure; (ii) facilitating intra-ASEAN trade and investment; (iii) coordinating and harmonizing policies and programmes; (iv) promoting and developing indigenous content; (v) promoting private-sector participation; (v) bridging the digital divide within ASEAN by encouraging capacity building and human resource development; and (vi) enhancing access to and use of telecommunications and IT (ASEAN 2008a).

4. ASEAN INFRASTRUCTURE DEVELOPMENT: ISSUES AND CHALLENGES

Infrastructure facilities (e.g., airports, seaports, roads, bridges, etc.) are important to a country in terms of attracting investment (especially FDI) and business. It influences where a company decides to locate an investment, build a factory, and establish a regional office, among others. A country's accessibility, the modernity and efficiency of its infrastructure is also major considerations.

ASEAN is rapidly developing, and thus its infrastructure, particularly transport sector is constantly changing. Economic cooperation and integration among diverse ASEAN countries is characterized by flexibility and pragmatism. Countries have often put aside political issues and differences, and have also continuously adapted to changing global conditions. In some ways, these characteristics also influence the pace of infrastructure development in ASEAN member countries.

The effective development of CBI is crucial to achieving the ASEAN Economic Community. As discussed earlier, overall infrastructure, especially CBI, has several important benefits. First, by enhancing physical connectivity in the ASEAN region, intra-regional trade and investment; and international competitiveness and productivity can be increased through lower production and trade costs. Second, it can narrow the development gap among ASEAN economies by providing poorer, land-locked countries with access to a larger regional market and regional production networks and supply chains. Third, it can satisfy basic needs by sharing scarce resources. Lastly, it can sustain high economic growth.

According to the ASEAN plan, the main focus is to integrate energy, transport, and communication networks (ASEAN 2008b). However, accelerating infrastructure development as well as integration is hampered by a number of issues that include: (i) geographical diversity; and different levels of economic and infrastructure development; and country capacity (e.g., the infrastructure of newer ASEAN members is relatively underdeveloped; on the other hand, the more mature ASEAN countries may have more developed infrastructures, but the cost of linking them can be prohibitive due to geographical barriers); (ii) asymmetric distribution of regional infrastructure costs and benefits across participating countries; (iii) synchronization of national and sub-regional infrastructure planning and financing; and (iv) massive financing requirements.

Addressing these difficulties will require the following measures: (i) creation of an enabling environment for cross-border infrastructure investment, (ii) effective coordination among multiple stakeholders (central government, local government, the private sector, and civil society) for CBI development, (iii) identification, development, prioritization, and preparation of "bankable" or commercially-viable projects; (iv) mobilization of ASEAN member countries' private savings to finance "bankable" projects; (v) evaluation of capital intensive projects in terms of symmetric distribution of cost and benefits; and (vi) identification of the limitations of traditional infrastructure financing.

The current global economic crisis will pose additional challenges to infrastructure development in ASEAN. As the current crisis continues, demand from advanced economies for ASEAN exports has decelerated, slowing production. Singapore is already in recession due to a steep fall in export. In fact, output in Malaysia and Thailand is projected to contract in 2009 due to a drop in exports and investments. High and undiversified dependence on exports of electronics, oil and crude palm oil are falling sharply in Malaysia and combined with its relatively small domestic market, underpins the projection of real GDP falling by 1% in 2009. In the case of Thailand, a slump in exports, exacerbated by the increasing political uncertainty is set to cause output to contract by twice as much. Moreover, some of the low-income countries are hardest hit by the crisis. For example, the decline in growth in Cambodia from is projected to be the steepest in developing East Asia. The economy is

affected by decreasing export orders for garments (which actually accounts for almost 80% of exports, mostly shipments are to the US), a drop in construction, and an abrupt fall in private capital inflows and sharp decline in tourist arrivals (World Bank 2009). In order to mitigate, the medium-term consequences of the ongoing crisis, ASEAN countries should bring forward and step up infrastructure investment, particularly in regional infrastructure, in order to enhance regional demand.

ASEAN should take note of the lessons of the 1997–1998 Asian crisis, where public and private infrastructure investments substantially declined in many Asian economies. In fact, infrastructure programs were among the first to be cut in Indonesia, the Philippines, and to a lesser extent, Malaysia. Indonesia and the Philippines are still suffering from a large infrastructure deficit due to this collapse in infrastructure investment, and poor infrastructure has kept growth rates below their potential in both countries (Greenwood 2006).

To mitigate the medium-term effects of the on-going crisis, ASEAN needs to offset the decline in global demand by increasing regional demand. This implies greater investments in national and cross-border infrastructure that would support ASEAN production networks and supply chains for intraregional trade. CBI connecting to larger markets like PRC and India would also be important.

The current crisis presents an opportunity to enhance infrastructure development. Several ASEAN member countries have been trying to stimulate domestic demand, and alleviate the impact of the spiraling crisis, by setting aside resources for infrastructure investment under their stimulus packages (Table 7). For example, Singapore, which is expected to be hit hard by the current crisis, plans to spend between US\$11.9–13.2 billion on infrastructure projects (such as a new cruise liner terminal, new roads and parks, upgrading of schools, sports facilities and public housing estates) in 2009 (Nopporn 2009). ASEAN economies should seek to implement their fiscal stimulus packages in a coordinated manner and ensure significant spending on infrastructure, particularly CBI. Towards this end, enhanced regional infrastructure cooperation can be an important way to complement country-level efforts.

**Table 7: Announced Stimulus Plans of Selected ASEAN member countries
(4th Quarter of 2008–1st Quarter of 2009)**

Country	Amount US \$ billion	% of GDP
Indonesia	6.7	1.3
Malaysia	17.2	4.0
Philippines	6.1	1.2
Singapore	13.7	1.2
Thailand	8.5	3.3
Viet Nam	1.0	1.1

Source: Ortiz 2009

It should be noted however, that new infrastructure programs are often very difficult to commence in a short period of time. Instituting large-scale changes in government investment programs require considerable political consensus and extensive local-level consultations, actions which take time that is lacking during a crisis.

The unique strength of the ASEAN lies in its formal institutional structure, characterized by binding agreements among its member countries. Institutionally, however, it is important to note that the ASEAN's main focus is economic integration through the ASEAN Free Trade Area (AFTA); infrastructure development remains just a part of this overall initiative.

Similarly, other Southeast Asian subregional cooperation programs such as the GMS, IMT-GT and BIMP-EAGA have CBI development as only part of their objectives.

In contrast, initiatives in Latin America and Europe have created dedicated institutions for CBI development. Latin American countries have established two institutions: the Initiative

for the Integration of Regional South American Infrastructure (IIRSA) and Plan Puebla Panama (PLPP). IIRSA is an informal institution made up of 12 Latin American countries (Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Guyana, Paraguay, Peru, Surinam, Uruguay and Venezuela), supported primarily by the Inter-American Development Bank (IDB) with the aim to build better regional connections.⁴ PLPP, on the other hand, is composed of 9 countries (Belize, Columbia Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama) in Central America, with the aim to create a trade and development corridor in the region.⁵

In the European Union,⁶ the European Commission (EC) created a subsidiary called the Trans-European Networks (TENs) to deal primarily with infrastructure network development. The legal basis for TENs is provided in the Maastricht Treaty of 1992, which recognized that inadequate cross-border infrastructure acts as a barrier to trade and labor mobility. The Treaty defines EU's responsibilities—establishing guidelines for identifying projects of common interest; implementing measures necessary for network interoperability; supporting projects of common interest; contributing financing through Cohesion Fund; and promoting coordination among member countries. The planning and financing of TENs has been managed supranationally. Three types of infrastructure networks have been established: the Trans European Transport Networks (TEN-T), the Trans-European Energy Network (TEN-E), and the Trans-European Telecommunications Network (eTEN) (Nunez-Ferrer 2007).

To date, ASEAN has created an informal center focusing on energy infrastructure—the ASEAN Centre for Energy. In order to enhance its infrastructure development role, ASEAN should consider establishing more formal entities or institutions for CBI development in transport and energy, similar to those in Europe and Latin America.

5. MEETING ASEAN'S INFRASTRUCTURE FINANCING REQUIREMENTS

Infrastructure investment has played an important role in ASEAN growth. However, increasing aggregate demand has highlighted shortfalls in the quantity and quality of infrastructure. This is increasingly seen as a binding constraint on accelerating further growth.

Addressing current shortfalls in infrastructure and meeting additional requirements to support future economic growth will require massive investments over the next decade. As shown in Table 8, ASEAN countries will require infrastructure investments amounting to US\$596 billion during 2006–2015, with an average investment of US\$60 billion per year.

⁴ Additional details for IIRSA can be accessed at www.iirsa.org/.

⁵ Additional details for PLPP can be accessed at www.planpuebla-panama.org/.

⁶ Its members are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Additional details can be accessed at http://ec.europa.eu/index_en.htm

**Table 8: Projected Infrastructure Requirements in ASEAN 2006–2015
(US\$ billion)**

Sector	New Capacity	Maintenance	Total
Power	170.3	46.0	216.3
Transport	95.6	61.2	156.8
Water and Sanitation	98.8	60.6	159.4
Telecom	30.9	32.7	63.6
Total	395.6	200.5	596.1

Source: Goh Ching Yin 2008 and Nangia 2008

This is roughly five times the actual amount invested by the private sector during 1990–2006 (Table 9). Of this projected amount, around US\$395.6 billion (66%) will be needed for investment in new projects, while US\$200.5 billion (34%) will be required for maintenance. These estimates must only be regarded as a reference point; rather than a substitute for detailed, bottom-up country- and sector-specific estimates which take into account actual conditions in each country. In view of the on-going financial crisis, the demand for infrastructure investment requirement may be different from these estimates.

Table 9: Private Sector Investments in ASEAN 1990–2006 (US\$ million)

Sector	Energy	Transport	Water & Sanitation	Telecom	Total
Cambodia	231	445		331	1,007
Indonesia	13,160	4,634	992	18,455	37,241
Lao PDR	2,586			198	2,784
Malaysia	14,313	16,113	10,144	8,577	49,147
Myanmar	719	50			769
Philippines	15,818	2,625	8,071	11,545	38,059
Thailand	12,244	3,576	596	14,254	30,670
Viet Nam	2,715	115	213	946	3,989
Total	61,786	27,558	20,016	54,306	163,666

Source: Goh Ching Yin 2008 and Nangia 2008.

Meeting this financing requirement will require greater coordination between the public and private sectors. The use of Public Private Partnership (PPP) in infrastructure development will have to be enhanced. Towards this end, the public sector needs to (i) provide the enabling environment for private sector participation and funding; (ii) develop “bankable” projects, with proper consideration of various associated risks; (iii) improve financial intermediation functions by increasing banking sector efficiency; and (iv) strengthen bond markets to mobilize Asia’s massive savings.

The ASEAN “Comprehensive Investment Agreement” signed in February 2009 is an important step towards promoting private investment in key areas, including infrastructure. The main objective of this agreement is to promote greater cross-border investment and attract private investment by creating a more liberal, transparent and congenial investment environment, including by extending national treatment to ASEAN investors (ASEAN Secretariat 2009a).

Asia’s large foreign exchange reserves and savings represent a huge, untapped resource for financing regional infrastructure (Table 10). The ASEAN-5 countries alone have savings worth US\$457 billion, and foreign exchange reserves amounting to US\$409 billion. Innovative and highly liquid instruments and products are required to channel a portion of these resources into productive infrastructure development. Initially, an infrastructure fund such as an ASEAN Infrastructure Bond Fund can be created, utilizing the savings and reserves of ASEAN-5 and Brunei. Other ASEAN members and countries outside ASEAN

can join this regional collaborative effort eventually. Integrating financial markets will also be necessary for effective intermediation of ASEAN savings. Such regional-level approaches should be complemented by domestic initiatives to strengthen local currency bond markets.

Table 10: Domestic Savings and Foreign Exchange Reserves in Asia

Country/region	2007 (US\$ billion)		
	GDP	Saving	Reserves
PRC	3239	1384	1434
Japan	4403	1311	923
East Asia-5	9173	3207	3034
ASEAN-5	1091	457	409
India	1085	329	267
ASIA-11	11349	3992	3710

Note: East Asia 5=PRC; Hong Kong, China, China; Japan; Republic of Korea, Taipei,China; ASEAN 5=Indonesia, Malaysia, Philippines, Singapore, Thailand; ASIA 11= East Asia 5, ASEAN 5, and India

Sources: ADB 2007, 2008; IMF 2007; and World Bank 2008b.

ASEAN countries should also mobilize resources from Japan, Korea and PRC through ASEAN+3 cooperation as well as from India. Connecting ASEAN countries to countries in South and East Asia, particularly India and PRC, will encourage investment from these regions. With PRC, India, and ASEAN emerging as the three major growth centers in Asia, their connectivity will be important. PRC already has plans to enhance connectivity with ASEAN countries. For example, PRC Foreign Minister Yang Jiechi recently announced a US\$10 billion investment cooperation fund, as well as US\$15 billion in credit, to help Southeast Asian countries mitigate the negative impact of the global financial crisis. The objective of the fund is to promote infrastructure development connecting PRC with ASEAN nations (Dune 2009). PRC is looking to accelerate the development of regional and sub-regional transport, power and communication infrastructure achieve interconnectivity and establish network.

Another way to meet long-term financing needs for infrastructure is to develop local currency bond markets. The need to develop bond markets as an alternative source of funding to bank loans was one of the most important lessons of the 1997 Asian Financial Crisis. To ensure the availability of long-term domestic currency funding (and prevent maturity and currency mismatches), policy makers have reached an agreement to promote the development of a regional bond market. The Asian Bond Markets Initiative (ABMI), launched in August 2003 and endorsed by the finance ministers of ASEAN+3, seeks to promote the development of local currency bond markets. The Asian Bond Fund (ABF), on the other hand, was launched by the Asian central banks through the Executives Meeting of the East Asia-Pacific Central Banks (EMEAP) in June 2003.

As of June 2008, local bond markets in ASEAN+3 had grown by a factor of three, with total outstanding bonds issues in emerging East Asian currencies totaling US\$ 3.9 trillion. Indonesia, Philippines and Viet Nam instituted new rules aimed at bolstering bond issuance from revenue-generating sectors, such as local government public utilities (ADB 2009). There is a need to develop an ASEAN Infrastructure Bond Fund that focuses on building productive infrastructure while utilizing the region's available savings.

More importantly, regional initiatives are needed to address certain structural issues which have led to chronic underinvestment in infrastructure. These include high risk premiums associated with infrastructure projects in low-income or highly-indebted countries; uncertainties due to long tenures and the requirements for government guarantees; foreign exchange risks, including currency mismatch arising from long tenures; and the weak capacity of domestic financial institutions and markets. Other impediments include high costs

and limited insurance facilities; process inefficiencies and lack of capacity to manage projects; limited information and coordination; and market and regulatory restrictions (Goh Ching Yin 2008).

Regional efforts to address these structural issues are already underway. ASEAN finance ministers have proposed the establishment of ASEAN Infrastructure Financing Mechanisms (AIFM), with the following areas of focus (i) promoting best practices in infrastructure financing (this includes the establishment of an enabling legal regulatory framework); (ii) reviewing facilitation measures in relation to insurance and long-term currency hedging; and (iii) promoting the development of private sector capacity to facilitate fund raising and risk mitigation for infrastructure projects (this includes the developing innovative products and deepening capital markets).

The AIFM aims to (i) accelerate infrastructure development to promote regional economic growth and prosperity, (ii) enhance balance sheet recycling and strengthen ASEAN's financial resilience, (iii) accelerate private sector development, increase demand for intermediation services, and deepen capital markets across ASEAN; (iv) support the branding of ASEAN by providing a platform for the creation of regional products; and (v) strengthen intra-regional links and growth dynamics, with a view to accelerating the realization of the ASEAN Economic Community 2015 vision (Goh Ching Yin 2008). An AIFM task force has already been established to support implementation.

The development of an appropriate ASEAN infrastructure financing mechanism for developing and financing bankable projects, particularly cross-border projects, is crucial for enhancing physical connectivity within the region.

6. ROLE OF MULTILATERAL DEVELOPMENT BANKS (MDBS)

MDBs such as the Asian Development Bank (ADB) and the World Bank continue to play an important role in financing and sustaining infrastructure activities in ASEAN.

In view of the ongoing global financial crisis, MDBs need to play a much bigger role by providing additional resources more effectively and flexibly to support growth through infrastructure development (Kuroda 2009). MDBs, as well as bilateral organizations such as the Japan Bank for International Cooperation (JBIC), can help address gaps in financing if private sector funds prove inadequate, by mobilizing long-term funds through capital markets and co-financing, and stimulating market activities through the issuance of prime name credit papers and local currency bonds. They can facilitate regional cooperation for the provision of regional public goods; promote greater transparency and information dissemination; and contribute to policy dialogue. Finally, they can help improve the flow of private savings and capital into infrastructure investments by (i) developing bankable projects; (ii) designing appropriate, innovative financial instruments; (iii) assisting countries to enhance their technical capacity and knowledge, (iv) enhancing financial market depth efficiency, liquidity, and adherence to international and regional standards or best practices; and (iv) promoting further financial integration in ASEAN.

The ADB, in particular, needs to enhance its support to ASEAN infrastructure development, while continuing to play the roles of (i) a money bank, by providing loans and guarantees, and catalyzing private sector financing (e.g., raising funds in international capital market and lending funds with small spread); (ii) a knowledge bank, by providing policy and technical advice; (iii) a capacity builder for legal regulatory, policy and procedural components; and (iv) an honest broker, by coordinating multiply stakeholders. Indirectly, it can support infrastructure development by supporting the improvement of the overall investment climate and bond markets, particularly local currency bonds.

The ADB can help eliminate currency and maturing risks by provide long-term local currency loans through long-term swap arrangements. It can strengthen local-currency infrastructure bond markets by issuing local currency bonds with long-term maturities. Moreover, it can create and administer an ASEAN Infrastructure Financing Fund to intermediate official and private funds into infrastructure and other priority regional projects; this would include the use of sophisticated financial market products and concessionary finance.

MDBs should continue to provide technical/research assistance to the ABMI Working Groups to help strengthen ASEAN bond markets. This will help ASEAN countries recycle its massive savings and foreign reserves for “bankable” infrastructure projects.

7. CONCLUDING REMARKS

ASEAN has come a long way from the days of national autarkic and inward-looking policies. It has improved its ability to respond to the challenges of regional integration and globalization; in so doing, it has succeeded in transforming itself into a key player in the world economy. ASEAN plans an economically integrated ASEAN Economic Community in 2015. In order to achieve this goal and to sustain its stellar economic performance, addressing the region’s current and future demand for infrastructure will be critical. There is a need to build an ASEAN regional infrastructure initiative based on a shared strategic vision with strong commitment of all participating economies.

In order to tap its large economic potential and to weather the ongoing global economic crisis, ASEAN needs to enhance regional cooperation in infrastructure development, particularly in cross-border infrastructure (CBI) provision and financing. Pushing for CBI will be essential to support growth and promote cross-border trade and investment, both within and outside the region. The long-term benefits of CBI projects should far exceed those of domestic projects.

In order to achieve ASEAN’s vision of a stable, prosperous, and highly competitive region, with equitable economic development, and reduced poverty and socio-economic disparities, regional infrastructure cooperation for cross-border connectivity must complement efforts in infrastructure development at the country level. In this difficult time, by working together, ASEAN countries can sustain economic growth as well as move closer to their goal of integration.

It is also significant to note that CBI development in ASEAN can assist in establishing connectivity to large markets, such as PRC in East Asia and India in South Asia. At the same time, it can assist the process of ASEAN+3 and ASEAN plus India cooperation. In this regard, ASEAN infrastructure integration can act as a building block for pan-Asia cooperation and integration.

There are various subregional initiatives in infrastructure development which sometimes overlap with ASEAN, such as the GMS, BIMP-EGA, and IMT-GMT. ASEAN can play a role in facilitating better coordination and planning among these initiatives.

With strong cooperation and coordination among member countries, the help of MDBs like ADB and World Bank, more integrated and stable financial markets, the creation of innovative financial instruments, and sound macro economic policies towards effective maintenance and development of pan-ASEAN infrastructure, there is no doubt that ASEAN can strengthen its economic integration and achieve the goal of the ASEAN economic community by 2015.

REFERENCES

- Ang, J. 2008. Determinants of Foreign Direct Investment in Malaysia. *Journal of Policy Modeling* 30(1): 185–189.
- ADB. 2005. GMS Transport Sector Strategy Study-Recommendations on Strategic Objectives and Directions for the Sector. ADB TA 6915 REG Report. Prepared for the 9th Meeting of Subregional Transport Forum. Beijing, PRC. 1 June.
- . 2007. ADB's Infrastructure Operations: Responding to Client Needs. Manila: ADB
- . 2008. Vientiane Plan of Actions for GMS Development 2008–2012. Manila
- . 2009a. Asian Bond Markets Initiative: Progress to date, the New Medium-term Strategy, and Prospect for the Regional Bond Market Development, ADB
- . 2009b. Asian Development Outlook 2009: Rebalancing Asia's Growth. Manila: ADB
- ASEAN Ministers on Energy Meeting (AMEM). 2004. ASEAN Plan of Action for Energy Cooperation 2004–2009. June. Manila: ADB.
- Association of Southeast Asian Nations (ASEAN) Secretariat. 2002. Southeast Asia A Free Trade Area. Available: <http://www.seansec.org/viewpdf.asp?file=/pdf/afta.pdf>
- . 2007. Approach to development gaps in ASEAN: a Vietnamese perspective. *ASEAN Economic Bulletin*.
- . 2008a. ASEAN Infrastructure. Available: <http://www.aseansec.org/10367.htm>.
- . 2008b. ASEAN Projects. Available: http://www.aseansec.org/asean_project.htm.
- . 2008c. ASEAN Overview. Available: <http://www.aseansec.org/64.htm>.
- . 2009a. ASEAN Updates: Available: <http://www.aseansec.org/>.
- . 2009b. Joint Ministerial Statement 8th ASEAN Finance Ministers' Meeting. Available: <http://www.aseansec.org/16061.htm>.
- Baird, M. 2004. Resource mobilization: public and private sector roles. Paper presented at the Asia-Pacific Infrastructure Forum, Melbourne. 1–3 December 2004.
- Barrios, E. 2008. Infrastructure and Rural Development: Household Perceptions on Rural Development. *Progress in Planning* 70: 1–44.
- Bhattacharyay, B. 2008. Infrastructure and Regional Cooperation Concept Paper for ADB/ADBI Flagship Study. Available: <http://www.adbi.org/research/infrastructure.regional.cooperation/>
- Brunei Indonesia, Malaysia, Philippines-East ASEAN Growth Areas (BIMP-EAGA). 2009. BIMP-EAGA documents. Available: <http://www.bimp-eaga.org/documents.php?p=o>
- Brooks, D. 2008. Asia's Infrastructure, Trade Cost and Regional Cooperation. Paper presented at LAEBA 2008 Conference on Trade Cost and Regional Cooperation, Lima, Peru. 17 June.
- Chen, L. 2008. The Market Driven Trade Liberalization and East Asian Regional Integration. *HEID Working Paper No.12/2008*. Geneva: The Graduate Institute.
- Dune, L. 2009. China Plans \$10 Billion ASEAN Investment Funding. *Bloomberg*. Available: http://www.bloomberg.com/apps/news?pid=newsarchive&sid=af3dZLLkeh_4. Date Accessed: 12 April 2009.
- Electricity Generating Authority of Thailand (EGAT). 2003. ASEAN Power Grid. Available: http://www.egat.co.th/apg/eng/index_eng.html

- Estache, A., and M. Fay. 1995. Regional Growth in Argentina and Brazil: Determinants and Policy Options. Washington, DC: World Bank.
- Estache, A., and A. Goicoechea. 2005. A "Research" Database on Infrastructure Economic Performance. Policy Research Working Paper 3642. World Bank: Washington, DC.
- Esfahani, H., and M. Ramirez. 2003. Institutions, infrastructure and economic growth. *Journal of Development Economics* 70: 443–477.
- Fujita, M. 2005. Regional Integration in Asia: How to be further promoted in harmony?. *Dynamism and Uncertainty in Asia*. The Science Council of Japan Conference on Sustainability. Kyoto, Japan. September 9–10.
- Ghosh, B., and P. De. 2005. Investigating the linkage between infrastructure and regional development in India: era of planning to globalization. *Journal of Asian Economies* 15 (16): 1023–1050.
- Goh, C. Y. 2008. ASEAN Infrastructure Financing Mechanism: concepts and progress. Paper presented at the ASEAN Infrastructure Financing Mechanism Conference, Kuala Lumpur, Malaysia. 10 November.
- Greater Mekong Subregion (GMS). 2009. Greater Mekong Subregion. Available: <http://www.adb.org/GMS/Sector-Activities/energy.asp>. Date accessed: 30 April
- Green, D. 2009. Too Little, Too Late in Southeast Asia. *Far Eastern Economic Review*. Hong Kong: Review Publishing Company Ltd. March 09. Available: <http://www.feer.com/essays/2009/march/too-little-too-late-southeast-asia>. Date accessed: 8 May 2009.
- Indonesia-Malaysia-Thailand Growth Triangle. 2009. Overview of the IMT-GT Subregion. Available: <http://www.adb.org/IMT-GT/about.asp>
- International Monetary Fund. 2007. World Economic Outlook. Washington, DC: IMF.
- . 2008a. World Economic Outlook. Washington D.C: IMF.
- . 2008b. World Economic and Financial Surveys Regional Economic Outlook Asia and Pacific. Washington, DC: IMF.
- Kawai, M. 2004. Regional economic integration and cooperation in East Asia. Seminar on the "Impact and Coherence of OECD Country Policies on Asian Developing Economies." Paris: OECD.
- . 2007. Evolving Economic Architecture in East Asia. *Kyoto Economic Review*, 76(1) (June): 9–52.
- Kumar, N., and P. De. 2008. East Asian Infrastructure Development in a Comparative Global Perspective: An Analysis of RIS Infrastructure Index. Research and Information System for Developing Countries (RIS). Discussion Paper No. RIS DP 35 (March).
- Kuroda, H. 2006. Infrastructure and Regional Cooperation. Paper presented at the Annual Bank Conference on Development Economies, Tokyo, Japan. May 29–30.
- . 2009. Crisis Outlook for ASEAN, Risks, Policy Issues, and ADB's Role. Speech at the 13th ASEAN Finance Ministers Meeting. Thailand. 09 April.
- Mekong River Commission (MRC). 2009. Vision and Mission. Available: http://www.mrc.mekong.org/about_mrc.htm.
- Nadiri, M., and T. Mamuneas. 1994. The Effects of Public Infrastructure and R&D Capital on the Cost Structure and Performance of U.S. Manufacturing Industries. *Review of Economics and Statistics* 76: 22–37.

- Nangia, R. 2008. Overview of Infrastructure Financing in ASEAN. ADB Internal Report. Manila: ADB.
- National Research Council. 1987. Infrastructure for the 21st Century: Framework for Research Agenda, Committee on Infrastructure Innovation. National Academy Press: Washington, DC.
- Nopporn, W. 2009. Singapore:\$12 billion spending on infrastructure this year. Interactive Investors. Available at: <http://www.iii.co.uk/news/?type=afxnews&articleid=7230714&action=article> Date accessed: 16 April.
- Nunez-Ferrer, J. 2007. EU budget and policy reforms in order to promote economic growth. ITPS working document R2007:015. Available: www.ITPS.se.
- Ortiz, I. 2009. Fiscal Stimulus Plans: The Need for a Global New Deal. International Development Economics Associates. Available at: http://www.networkideas.org/news/mar2009/news18_Fiscal_Stimulus_Plans.htm
- Razak, S. 2008. ASEAN Infrastructure Financing Mechanism (AIFM): Concepts and Progress. Speech. delivered at the ASEAN Infrastructure Financing Mechanism Conference, Kuala Lumpur, Malaysia, 8 November 2008.
- Richards, D. 2008. Global Infrastructure-a Growth Story. In *Infrastructure Finance: Trends and Techniques*, edited by H. A. Davis. London: Euromoney Books.
- Seethepalli, K., M. Bramait, and D. Veredas. 2008. How Relevant is Infrastructure to Growth in East Asia? Policy Research Working Paper 4597. Washington, DC: World Bank.
- Scott, D. and I. Weber. 2004. China's corporate bond market: creating new options for infrastructure finance. Mimeo (June).
- Soesastro, H. 2007. Developing a Roadmap Toward East Asian Economic Integration. ERIA research project No. 1-1.
- American Heritage Dictionary of the English Language. 2000. Infrastructure. Fourth Edition. Houghton Mifflin Company. Boston, MA.
- United Nations Economic and Social Commission for Asian and the Pacific (UNESCAP). 2006. Enhancing Regional Cooperation in Infrastructure Development including that related to Disaster Management. New York: UN.
- Watanabe, O. 2006. Economic integration in East Asia and the roles of ASEAN and Japan, Seminar on A New Stage of East Asian Economic Integration. Singapore. 26 June.
- World Bank. 1994. *Infrastructure for Development, World Development Report 1994*. New York: Oxford University Press.
- . 2002 *Empowerment and Poverty Reduction: The World Bank's Agenda*. World Bank: Washington, DC.
- . 2007. World Development Indicators. World Bank: Washington, DC.
- . 2008a. World Bank Database on Logistics Performance Index (LPI). Available: <http://info.worldbank.org/etools/tradesurvey/mode1b.asp>. 28 August.
- . 2008b. World Development Indicators. World Bank: Washington, DC.
- . 2009. East Asia and Pacific Update: Battling the Forces of Global Recession. EAP Half-Yearly Update. World Bank: Washington, DC. April.
- Yong, O. 2004. Economic Integration and Energy Cooperation in ASEAN. Keynote speech at the 8th Gas Information Exchange (GASEX): Singapore. 01 June. Available: <http://www.aseansec.org/1639.htm>.