

Chapter 2

Infrastructure Development in Cambodia

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Chapter 2: Infrastructure Development in Cambodia

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Abstract

It is generally believed that the backbone of any sustainable development is physical infrastructure: roads and bridges, railways, ports and inland waterways, airports, electricity generation and network, irrigation, telecommunications, etc. The improvements in infrastructure will have a positive impact on both economic and social development, including education, health, tourism, and trade, as well as on a nation's integration with the region and the world. Cambodia still lacks physical infrastructure to promote such social and economic development.

This report's main objective, therefore, is to present the current status of Cambodia's infrastructure, its strategy and plan for infrastructure development, the emerging issues and policy recommendations for infrastructure development.

1. INTRODUCTION

Cambodia covers 181,035 square kilometers, which is divided into three topographic regions: the Central Plain Region, Mountainous Region, and Coastal Region. These regions comprise about 51 percent, 39 percent, and 10 percent, respectively, of Cambodia's total area. Cambodia has made considerable progress in the one-and-a-half decades since the Paris Peace Accords of 1991. That event marked the beginning of a transition from conflict to peace, bringing most of the parties involved in the

low-intensity civil war of the 1980s to agree to compete for power through elections rather than through military struggle. This agreement also cleared the way for international recognition, inflow of foreign investment and development assistance, and transition from an isolated, subsistence-oriented economy to one based on international integration and markets. As a result, high economic growth and improved national living standards were realized. For instance, the economic performance in 2006 was robust, with sustained growth rate due to actions taken by the Royal Government of Cambodia (RGC) to support agricultural production and the garment sector. Economic growth was 10.4 percent in 2006, compared to 13.4 percent in 2005, reflecting the 4.4 percent expansion of agricultural production and the rebound of industrial and service sectors, which increased by 17 percent and 11.4 percent, respectively.

Infrastructure is a broad concept linked to every facet of the economy and human life. One aspect of infrastructure development is to build new assets and maintain the existing ones; another is to deliver infrastructure services. Transport, telecommunications, energy, and water have become part and parcel of human existence. These are central to the household life and economic production. It is difficult to imagine a modern world without them.

A lack of such infrastructure facilities is considered to be a major structural weakness that holds back economic growth and development. It is often said that infrastructure can be considered as the “wheels” of economic growth. Furthermore, infrastructure also helps to spread the benefits of growth, which makes the development process more inclusive. Economic growth brings economic development, but the “inclusiveness” of

development is an important issue for policymakers. There is no guarantee that the benefits of economic growth are shared by all, which consequently could have reduced poverty.

While economic growth is a necessary condition for poverty reduction, it is not sufficient. Here, infrastructure plays a dual role: It supports higher economic growth and strengthens the sharing of the benefits of growth. Cambodia generally has less developed infrastructure than its neighboring countries due to the destruction brought during the long civil war and to the lack of maintenance since then. This is a serious obstacle to the socio-economic growth of this country as physical infrastructure is important for realizing both sustainable economic growth and poverty reduction.

2. CURRENT STATUS OF INFRASTRUCTURE DEVELOPMENT

2.1. Roads

In Cambodia, road transport accounts for an overwhelming share of the total transported volume of passengers (65 %) and freight (70 %). Only about 20 percent of the roads and highways are covered with asphalt and in passable condition; about 50 percent of the roads are made of crushed stone, gravel, or improved earth; and the remaining 30 percent are unimproved earth or little more than tracks. The existing Cambodian road network system consists of:

- (1) National Roads: One-digit national roads have a total length of 2,052 kilometers, and two-digit national roads have a total length of 2,643 kilometers, respectively representing 7 percent and 9 percent of the total roads in Cambodia.

- (2) Provincial Road: This is labeled as three- and four-digit national roads and has a total length of 6,615 kilometers, representing 22 percent of the total roads.
- (3) Rural or Tertiary Road: This has a total length of about 18,948 kilometers and is 62 percent of the total roads.

By comparison, Cambodia's infrastructure access and stock are among the weakest in the ASEAN (See Table 1).

Table 1: Infrastructure Access and Stocks

	Water supply Access ¹	Sanitation Access ²	Electricity Access ³	Telepohe Access ⁴	Internet Access ⁵
Malaysia	93	--	97	62	34.4
Thailand	93	98	84	50	11.1
Philippines	86	83	79	31	4.4
China	76	39	99	42	6.3
Indonesia	78	55	55	13	3.8
Vietnam	49	25	81	9	4.3
Cambodia	44	22	17	4	0.2
Lao PDR	58	30	41	3	0.3

Source: ADB, JBIC, WB, (2005), Connecting East Asia: A New Framework for Infrastructure.

Note: 1. Percentage of population with access to at least 20 liters per person per day from “improved” water supply from a source within one liko meter from the user’s dwelling

2. Percentage of population with excreta disposal system “under improved” sanitation technologies; “adequate” if it is private or shared (but not public) and if hygienically separates from human contact

3. Percentage of households with electricity access through commercially sold electricity, both on-grid and off-grid

4. Telephone subscribers per 100 inhabitants

5. Number of users per 100 inhabitants

2.2. Road Network Coverage

The road network is the lifeline of Cambodia’s development and covers all major regions in the country. However, Cambodia remains to have unpaved sections and temporary bridges. Its coverage is as follows:

- The one-digit national road links Phnom Penh to major provincial centers except eight provinces connected by two-digit national roads with fair to poor condition. Two international airports can be accessed via one-digit national roads while eight national airports can be reached via the one-and two-digit national roads.
- District centers are accessed by provincial roads but 98.3 percent have either laterite or earth pavement.
- Access to commune and villages are via rural roads. Majority of rural road conditions vary from poor to very poor.
- Crossing major rivers is made possible via three bridges only (Mekong, Tonle Sap and Bassac Rivers). Other crossings are supplemented by ferry services.
- Although access to industrial, tourism, agricultural, and residential areas are via one-digit national roads to three-digit roads, the conditions of roads vary from good (1-digit) to poor and very poor (2-digit/3-digit).

Table 2: Transport Networks

	Road network (km per 100 km ²)		Rail network (km per 100 km ²)
		Percentage of paved road	
Malaysia	20	76	0.49
Thailand	12	97	0.79
Philippines	68	22	0.16
China	19	91	0.64
Indonesia	20	58	0.25
Vietnam	29	25	0.97
Cambodia	22	4	0.42
Lao PDR	14	15	0

Source: ADB, JBIC, WB, (2005). *Connecting East Asia: A New Framework for Infrastructure*.

2.3. Current Road Conditions

According to the report of the Japan International Cooperation Agency (JICA) released in 2006, only 7.4 percent of the total road network (30,258 km) are paved, most of which belonging to the one-digit national road and some to the two-digit National Roads. About 80.1 percent of the two-digit roads are unpaved while 98.4 percent of the provincial roads are unpaved. Practically almost all rural roads are unpaved at 99.7 percent. These unpaved rural roads are covered with earth or laterite and, in most cases, are hardly accessible or totally unpassable during the rainy season, which often leads some parts of the country to remain isolated as well as to face economic disruption. A study showed that, in 2005, about 15 percent of the rural population (compared to 20%

in 2002) lives more than 5 kilometers away from a year-round accessible road. In the same year, about 11 percent of the rural population needs to travel for more than 30 minutes by motorbike to reach the nearest year-round road.¹ As a result, these people often become secluded during the rainy season, and the lack of access to market and public services poses a major constraint. In 2006, according to the Annual Progress Report 2006 National Strategic Development Plan, NSDP (2006-2010), 92 rural roads with the length of 264 kilometers were constructed; 44 roads of 707 kilometers were repaired; and 118 roads of 822 kilometers were maintained.

As of July 2005, 76 percent of one-digit road projects were completed while 10.2 percent were ongoing, and 13.8 percent were under tender. However, two-digit road conditions vary from good to poor, with 60 percent of the road in poor and very poor condition. Moreover, three-digit road conditions vary from fair to very poor with more than 90 percent in poor to very poor condition. The width of the road network in Cambodia is still in a concern. For example, 19 percent of the two-digit roads are a narrow 4.5m in width while 62.3 percent have widths insufficient for two-lane traffic. Moreover, 33 percent of the three-digit roads are less than 4.5m wide while 85 percent have widths insufficient for two-lane traffic.

2.4. Current Bridge Condition

All along one-digit national roads, 26 bridges (608m) or 4.4 percent of the bridges are

¹ Kov Phyrum (2007), "Rural infrastructure development", *Economic Review*, Vol. 4, No. 1, Economic Institute of Cambodia (EIC), Cambodia, p. 12.

still temporary bridges and will need replacement by permanent bridges. Moreover, 31 permanent bridges (602m) that are narrow (less than 7m wide) will be widened or replaced to satisfy Cambodian standard requirements for bridges. As to the conditions of permanent bridges along these national roads, 86.9 percent are classified as good and 13.1 percent as fair (JICA 2006).

The improvement of one-digit road bridges covers 57 bridges, which are temporary and narrow bridges, with a total length of 1,210m.

For the two-digit national roads, new bridges have to be built in 107 locations while 17 historical bridges need to be replaced (new alignment) with permanent bridges. Additionally, 392 (50.1%) bridges along these two-digit national roads still need to be changed into permanent bridges. Existing permanent bridge conditions vary from good to poor, with more than half of the bridges in good condition. Around 655 two-digit road bridges (temporary, historical, nonexistent bridges and narrow bridges) that need to be improved have a total length of 11,785m.

Along provincial roads, more than half of the provincial bridges (618 bridges or 54.5%) are temporary while three locations need new bridges. About 10 bridges are in collapsed state while the permanent bridge conditions vary from good to poor, with 71.2 percent in good condition. In addition, about 207 bridges along three-digit roads will be improved. These total about 4,372m. For those along rural roads, 70 small rural bridges and 160 culverts were built in 2006.

2.5. Recent development of international highway route

The Cambodian Asian Highway (AH) intersection is located in the middle of Southeast Asia (AH1), connecting to two mega cities (Bangkok and Ho Chi Minh) in the north as well as connecting Sihanoukville Port to Lao PDR in the southern part of the North-South Economic Corridor (AH11). Some of the one-digit national roads are part of the international/regional highway network.

Table 3: 1 Digit National Roads.

Route No.	Length (Km)
AH1 (NR.1, NR.5)	572.4
AH11 (NR.4, NR.6, NR.7)	755
AH123 (NR.48, NR.3, NR.33)	163.3
GMS route (NR.66, NR.78)	464.9
Total	1,955.60

2.6. Railways

Cambodia has two rail lines, both originating in Phnom Penh and totaling about 650 kilometers of single railway tracks (i.e., one-meter-gauge track). Between 1929 and 1942, the French built the first line (Northern line), which runs from Phnom Penh to Poipet on the Thailand/Cambodia border via Battambang. Assistance from France, West Germany, and China in the late 1960s, supported the construction of the second line

(Southern line), which runs from Phnom Penh to Sihanoukville port.

A 1997 study of the Royal Railways of Cambodia (RRC) established that the condition of the Northern line was very poor and serious. The Northern line runs through rich agricultural areas that are poorly served by the road network and potentially connects with the Thai railway system, becoming part of the proposed Trans Asian Railway that links the ASEAN subregion with China. The Southern track is in reasonable condition, but the formation is poor and 70 percent of sleepers need a replacement. Rolling stock is old and inadequately maintained, with only 13 diesel locomotives, seven diesel shunting locomotives, and one rail car in service. Railway transport accounted for only 20 percent of passengers (persons/km) and 10 percent of goods (tons/km), but plans are underway to make this infrastructure more useful and productive (Royal Government of Cambodia 2007). In 2005, the railway transported 268,000 tons of freight, down 9.8 percent compared to 297,000 tons of freight in 2004. A total of 350 tons of luggage was transported in 2005, down 33.1 percent compared to 523 tons in 2004. The number of passengers transported by rail was 47,000, down 42.0 percent compared to 81,000 passengers in 2004 (NIS 2007).

2.7. Ports and Inland Waterways

Cambodia has two major international ports (at Phnom Penh and Sihanoukville), two coastal ports (at Kampot and Koh Kong), and other river ports at Kampong Cham, Kratie, Stung Treng, Kampong Chhnang as well as Siem Reap in the Tonle Sap. Cambodia has also long navigable inland waterways. Phnom Penh, located at the junction of the Bassac, the Mekong, and the Tonle Sap rivers, is the only river port capable of receiving nearly

800,000-ton ships during the wet season and 500,000-ton ships during the dry season. The Phnom Penh port remains an important port for international commerce as well as for domestic communications. A total of 1,186 ship movements were recorded in 2005, an increase of 8.4 percent compared to 1,094 ship movements in 2004. Of these movements, international shipping accounted for 77.4 percent, and local shipping has 22.6 percent of ship movements. A total of 742,883 tons of cargo were shipped through The Phnom Penh port in 2005, an increase of 23.4 percent compared to 601,971 tons in 2004. International cargo accounted for 93 percent of these shipped cargoes and domestic cargo, of only 0.7 percent (NIS 2007).

The second major international port is the Sihanoukville sea port. It is located on the Gulf of Thailand, 200 kilometers from the capital. There were 1,104 ship movements for Sihanoukville International Port in 2005, up 7.4 percent compared to 944 ship movements in 2004. A total of 4,318,151 tons of general cargo were shipped in 2005, an increase of 3.4 percent compared to those in 2004. The number of containers (TEU) shipped in 2005 was 215,198, up 8.9 percent compared to 197,613 containers (TEU) in 2004. Imports accounted for 107,624 containers (TEU), a hike by 8.9 percent compared to 98,830 containers (TEU) in 2004. Exports accounted for 107,574 containers (TEU), also higher by 8.9 percent compared to 98,784 containers (TEU) in 2004.

Except for the Phnom Penh and Sihanoukville ports, others are equipped only with small pontoons and simple piers at most. Riverbanks are used for loading and unloading at many of these ports.

Inland waterways were important historically in domestic trade in Cambodia. The Mekong and the Tonle Sab rivers and their numerous tributaries, and the Tonle Sab provided avenues of considerable length, including 3,700 kilometers navigable all year by craft drawing 0.6 meters, and another 282 kilometers navigable to craft drawing 1.8 meters. In some areas, especially the west of the Mekong River and north of the Tonle Sab River, villages were completely dependent on waterways for communications. Based on the 2006 annual progress report on the NSDP (2006-2010), waterway transport accounted for only 15 percent of passengers (persons/km) and 20 percent of goods (tons/km), although the total volume of goods handled at the two international ports was 2.6 million tons in 2006, an increase by 15 percent compared to that in 2005.

2.8. Airports and Aviation

At present, Cambodia has 10 airports, including the Phnom Penh International Airport near Phnom Penh and the largest one, and Siem Reap Airport, the gateway to Angkor Wat. These two major airports serve international flights. Phnom Penh International Airport currently handles nonstop international flights to nine destinations in eight countries/regions and has a 3,000-meter runway. However, the limited facilities make it impossible for large aircrafts to land. Thus, improvements on the facilities of the Phnom Penh International Airport is being contracted on a build-operate-transfer (BOT) scheme through a joint enterprise between French and Malaysian corporations.

Siem Reap Airport has a 2,500-meter runway and is used by domestic flights. Airline services connect Siem Reap with Bangkok. With assistance from the Asian Development Bank (ADB), airport facilities, including lights, have been improved.

In 2002, the remaining airports in Cambodia attracted less development. Battambang Airport and Sihanoukville Airport had surface-dressed runways, although not in good condition; others only had dirt airstrips. However, in 2006, eight domestic airports were repaired and maintained, especially their major parts such as runway, parking, and markings on the airport boundary. Two more foreign airlines started offering flights to Cambodia that year. In fact, international flights increased by 13 percent compared to that in 2005 (Royal Government of Cambodia 2007). According to the Open Air Policy of the Cambodian government, the number of airlines flying into Cambodia has been steadily increasing in recent years.

2.9. Telecommunications

Cambodia has been lagging far behind virtually every country in the world in terms of telecommunication capacity. When the civil war ended, there were only 3,000 telephone lines in Phnom Penh. Only short-wave radio with a limited capacity connected these lines with provincial cities. By 2006, there was a 33.67-percent increase in telephones in use compared to that in 2005. The year before that saw an increase of 28.9 percent. Mobile phones in 2005, meanwhile, totaled 840,916 units (or 95.3 percent) compared to 644,389 units (94.2 percent) in 2004. Note too that the number of units in use per 100 persons increased from year to year (6.4 units in 2005 and 7.98 in 2006). As a result, the telecommunication network expanded along with the increase in the number of telephone users (both mobile and fixed phones).

Cambodia's postal services used to be unreliable, but had recently been expanded and earning back the public's confidence. So with the country's national TV transmitter,

which has been upgraded. In 2006, the coverage, efficiency, and quality of government mass media (radio, TV, and press agency) were expanded and improved. About 70 percent of its people were able to receive news, education, and entertainment through the existing mass media, both government and private.

2.10. Internet Services

Currently, there are seven internet service providers (ISPs), namely, Camnet, Bigpond (CogeTel), Open Forum, CaminTel, Telesurf, Camshin, and Casacom. Broadband internet services are now being provided through ADSL wireless service or optic fiber in Phnom Penh. Expansion has occurred especially in rural areas of 24 provinces/municipalities, where more people are gaining access to e-mails and the internet. However, the cost of telecommunications remains high and burdens the entire population as well as businesses in Cambodia.

2.11. Electricity

The power sector was severely damaged by war and neglect from 1975 until 1995. It is currently in the process of recovery, thanks to the support of multilateral and bilateral agencies.

Electricity is generated and/or distributed by the following entities: Electricité Du Cambodge (EDC), private entities including independent power producers (IPPs) in provincial towns, licensees in smaller towns, and rural electricity enterprises (REE) in rural areas. The EDC, a state-owned enterprise established in 1996, has a consolidated

license (i.e., generation, distribution and transmission) for electricity supply in major cities and provinces, and provided 26.5 percent of Cambodia's total electricity supply in 2005. On the other hand, 71.1 percent of electricity supply was provided by IPPs, and 2.4 percent by 100 consolidated licensees. In 2006, electricity generation rose by 20 percent, i.e., increasing from 894.52 Gwh in 2005 to 1,073.28 Gwh in 2006. Electricity imported from Thailand and Vietnam also increased by around 20 percent and 60 percent, respectively.

Notwithstanding the progress made, the RGC recognizes that the high cost (the weighted average production cost of electricity is US\$0.15 per kWh compared to only US\$0.03 to US\$0.05 per kWh in the neighboring countries, (Kov Phyrum and Hean Menghong 2007), unreliability, and limited geographic availability of electricity constitute a major hindrance to private sector and rural development. Such high cost of electricity reflects the almost total dependence on imported oil-based fuel as the primary energy source (92% in Cambodia compared to 3% in Lao PDR, 2% in Thailand and 12% in Vietnam) [Kov Phyrum and Hean Menghong 2007], and the lack of a high voltage transmission system. Inefficient provision of electricity is an issue, particularly in rural areas. According to Kov Phyrum (2007), there are at present only 8.6 percent of rural households (equivalent to nearly 200,000 households) with access to electricity, while the rest use other traditional sources of energy such as kerosene and batteries for lighting. It is important to note that the average electricity's price in rural areas is about US\$ 0.75 per kWh compared to around US\$ 0.20 in urban areas.

For the whole country, the electrification rate is far below the rates of neighboring countries---i.e., less than 17 percent of Cambodian households can access electricity.

This pales when compared with the 84 percent in Thailand, 81 percent in Vietnam and 41 percent in Lao PDR. Such limited access to electricity impedes Cambodians from accessing new technology, diversifying economic activities, increasing agricultural production, and improving living conditions.

2.12. Irrigation System

Irrigation plays a key role in the efforts to attain food self-sufficiency and food security, which are part of the overall national goal of poverty reduction through socio-economic development. In 2005, only 16 percent of rural households have their paddy fields irrigated; the rest have their farmland relying upon rainwater(Kov Phyrum 2007). Consequently, these farmers often experience low production yields and earn lower incomes for their family, forcing them to remain trapped in poverty. Nevertheless, in 2006, many of the existing irrigation and drainage systems, particularly in high poverty incidence areas and along the border areas, were rehabilitated and reconstructed, with irrigating capacity for 89,211 hectares (75,101 hectares for wet-season rice cultivation and 14,110 hectares for dry-season rice cultivation) [Royal Government of Cambodia 2007].

3. INFRASTRUCTURE DEVELOPMENT PLAN IN CAMBODIA

To ensure the efficiency and sustainability of socio-economic development and poverty reduction, the RGC's key national strategic policy frameworks focus on the governance action plan and on the quality of people's life. The RGC has prepared two development guidelines in the past---the Socio-Economic Development Plan II 2001-2005 (SEDP),

and the National Poverty Reduction Strategy 2003-2005 (NPRS)---and a new five-year national development plan, the National Strategic Development Plan (2006-2010) (NSDP), which was enforced starting January 2006. It should be noted that its policy has shifted from “rehabilitation” to “economic development”², which meant Cambodia is now at the stage of growth where it is aligning all development participants, both domestically and internationally. Aside from national economic development, poverty reduction is another of the country’s major focus. Poverty, especially in the rural areas, is much more serious.

The SEDP II notes that infrastructure too is a key area that needs to be developed as it can have a multiplier effect on pro-poor, rural-based growth sectors, through supply side adaptation (transport, electricity, telecommunication, water supply, etc.). As for NSDP (2006-2010), its goals and targets would be operationalized and implemented through the Rectangular Strategy (RS). The RS, which involves growth, employment, equity and efficiency, provides a clear and focused framework that can drive the country toward the needed socio-economic development. The RS promotes, at its core, Good Governance as it pursues progress in various priority areas under its “growth rectangles”. Infrastructure is one of its Rectangular Strategy’s Growth Rectangles (2003-2008). The Rectangle covers: (a) further construction of transport infrastructure; (b) management of water resources and irrigation; (c) development of energy sector and

² The nation is in the process of rehabilitation of internal turmoil to development in peace. Therefore, the road network development in Cambodia has to proceed in order to realize sustainable and stable socio-economic development with poverty alleviation of the people and stabilization of daily life, especially in rural areas, as a nation located in the global center of the Greater Mekong Region.

electricity network; and (d) development of information and communications technology.³ The RGC does realize that the backbone to any sustainable development is physical infrastructure.

The following section presents the physical infrastructure development plans and investment needs in Cambodia---plans that are meant to fill the current infrastructure requirements earlier identified in this study.

3.1. Roads

Transportation networks and facilities that connect all corners of the country are the arteries that can transform the country into an integrated economy and are critical for distributed economic growth. The Road Master Plan has three main objectives. The first objective is to rehabilitate and reconstruct the main national roads, thereby improving land transport throughout the nation. The second is to build road links to neighboring countries, thereby opening up some of the more remote areas of the country to international trade and tourism. The last one is to develop a sustainable road maintenance program, thereby assuring that investment in road rehabilitation and reconstruction generates sustainable benefits.

Much has been done to rehabilitate all types of roads, which form part of the ASEAN road network. The priorities for the NSDP period are (Royal Government of Cambodia

³ The Rectangular Strategy consists of 4 rectangles: 1) Enhancement of Agricultural Sector; 2) Rehabilitation and Construction of Physical Infrastructure; 3) Private Sector Development and Employment Generation; and Capacity Building and Human Resource Development.

2006):

- Finalize and enact a Road Law to resolve the lack of systematic, unified planning and budgetary process, and to clearly delineate roles and responsibilities of respective government ministries and agencies for road rehabilitation and maintenance;
- Prioritize, rehabilitate and reconstruct as many roads as possible;
- Accord priority to remote communes or villages; expand the rural road networks to ensure that all communes have easy access to district headquarters and to national primary and secondary road networks;
- Address in a humane manner resettlement issues of people affected by road construction works;
- Ensure the maintenance of all roads is properly prioritized, bearing in mind that once a road is improved, increased traffic causes damage, thereby needing better and more frequent maintenance of the road;
- Use as much as possible, especially for rural road construction and maintenance, labor-intensive measures to increase rural incomes;
- Engage private sector on BOT schemes and other means of constructing and maintaining roads and bridges where cost could be recovered by tolls.

3.2. Road condition problems

The country's road condition is poor: Only 19.3 percent of the 11,310-kilometer national and provincial roads are paved, while 80.7 percent are earth, gravel or laterite roads. More than 60 percent of two-digit national roads and more than 90 percent of

the provincial roads are of poor to very poor conditions. Many roads are so narrow; some sections of one-digit road are in need of motorbike lanes; two-digit (62% less than 6.5m wide) and provincial (85% less than 6.5m wide) roads need to be widened to accommodate two-lanes of sufficient width.

Many roads are to be upgraded to international class. Plans include upgrading NR.1, 5, 4, 6, 7 to Asian/ASEAN class and enhancing NR.48, 3, 33, and NR.66, 78 to ASEAN/GMS class. These are aligned with the government's priority on further expanding trade, particularly within ASEAN, and on improving cross border linkage. The budget will be used to the maximum extent possible to finance the local cost of domestic roads and railway programs, either alone or with the support of international agencies. The reconstruction of NR.6 aims to link Siem Reap and Angkor Wat temples to Phnom Penh and Poipet/Cambodia-Thai border. This plan is anticipated to open and facilitate increased tourist traffic. The upgrade of NR.1 and 5 will constitute the first phase of the Ho Chi Minh-Phnom Penh-Bangkok Road through Cambodia. The NR.7 will be rehabilitated to link southern Laos with Phnom Penh and Sihanoukville via NR.4. Meanwhile, R. 48 will be rehabilitated to link Sihanoukville, the trade-industrial zone of the country, to the Bangkok port and the other main international ports in the region so as to facilitate the traffic of goods, particularly for regional trade. The rehabilitation of national roads in Ratanakiri and Mondulakiri Provinces will allow transport of goods and people across the border and beyond, and improve tourism arising from opportunities provided by the bilateral, triangle socio-economic cooperation area and Greater Mekong Subregion (GMS).

Meanwhile, roads along flood plains have insufficient slope protection. Temporary bridges will have to be replaced by permanent bridges; additional bridges need to be constructed where none exists; and roads with historical bridges need to be realigned. Some permanent narrow bridges have to be widened to accommodate the increasing number of vehicles and motorbikes in Cambodia each year.

3.3. Road Network Problems

There are still insufficient bridges crossing major rivers, and additional bridges are necessary along other rivers. Roads that are in very poor state or practically inadequate or unsafe should be reconstructed. In addition, there is a need to increase the pavement ratio for two-digit and provincial roads. Bypasses will also have to be built to serve through traffic along built-up/congested areas. Road section areas prone to flood damage (i.e., along Mekong, Tonle Sap and Bassac Rivers) will need improvement on slope protection and embankment stability.

3.4. Railways

The railway network has long been a vital but much damaged and grossly under-utilized asset. An immediate priority of the government is to prepare performance standards and a regulatory framework that aims to facilitate the expansion of private investment throughout the transport sector. The southern railway line between Phnom Penh and Sihanoukville port requires rehabilitation to reduce excessive operating costs. The aim here is for the railway to handle higher volumes of cargo traffic from the port at competitive freight rates compared to road transport rates.

The RRC Strategic Plan also lists five policy objectives: (1) continued rehabilitation of physical infrastructure; (2) increased income generation in an attempt to support rail operations; (3) promotion of competition with other transport modes in the context of a market economy; (4) promotion of other new rail services and increased connections with major points such as dry ports so as to transport containers and petroleum; and (5) construction of a 255 kilometers link between Phnom Penh and Lock Ninh (Vietnam) that would integrate the Cambodian railway into the regional railway system (Singapore-Kunming rail link).

Railways in Cambodia are expected to be part of the Asian Railway Network through linkage with the railway network in Thailand and Vietnam. To this end, it is necessary to link Sisophon with Poipet, and Phnom Penh with the Vietnam/Cambodia border. According to a Loan Agreement (GMS Rehabilitation of the Railway in Cambodia) between the Kingdom of Cambodia and ADB dated on March 5th, 2007, the ongoing project's objective is to facilitate subregional trade and economic growth in Cambodia by providing a cost-effective and efficient railway transport. The railway link through Cambodia is also an integral part of the GMS southern economic corridor, which is one of 11 flagship programs under the GMS subregional economic cooperation.

3.5. Ports and inland waterways

Almost all bulk imports and exports of the country are handled by two ports: the Sihanoukville deep sea port and Phnom Penh inland river port, which is capable of receiving ships of limited tonnage capacity. Investment priorities for ports and inland waterways transport include rehabilitation of dredgers to allow for the regular dredging

of all major waterways; and the rehabilitation and expansion of Sihanoukville deep water sea port, wherein a master plan was completed and the project implementation is currently being prepared with financial support from the government of Japan. Further upgrade of the Phnom Penh inland river port, improvement of smaller domestic river and lake ports, and upgrade of the existing ferries are also priorities.

Other plans include the establishment of national port policies and creation of maintenance organizations for waterways and ports. In addition, the government aims to develop and maintain the port facilities and to improve the Sihanoukville Port by constructing a new cargo wharf; expanding the container wharf; building a container yard and container cranes supply; and improving the roads, power supply, and lighting system in the port area.

3.6. Airports and aviation

The availability of Civil Aviation services is a prerequisite for tourism since it has a significant multiplier effect on the economy. Therefore, the Phnom Penh and Kang Keng International airports will be further improved under the existing BOT agreement. Cambodia needs to expedite the ongoing BOT project to accommodate large airplanes. Siem Reap international airport also needs an upgrade. Of the domestic airports, some need to be brought to higher standards so as to increase the passenger flow to remote areas with high tourism potential.

Cambodia is now developing telecommunication networks, paving the way for improved communications in the air traffic control system, covering both the airspace

over the airport and the air routes, including building-relevant facilities. The government will explore various avenues for financing these endeavors, particularly through BOT arrangements involving the private sector.

3.7. Telecommunications

The long-term development vision is to develop a cost-efficient and world-class post and telecommunication system, incorporating advanced information technology and focusing on modernization efforts and nationwide coverage. This vision requires huge investments to build the backbone infrastructure of the telecommunications systems, especially high-speed optical fiber cables for the development of rural telecommunications systems. The priorities of the RGC in the NSDP (2006-2010) are (1) to bring down rapidly the present high cost of telecommunications; (2) to expand the telecommunication network in urban areas and extend them to smaller cities and rural areas; (3) to expand postal services from cities and urban areas, to rural areas and provide quality, reasonably price services while strengthening the capacity of responsible institutions; (4) to expand the coverage and improve the efficiency and quality of government mass media (radio, TV and press agency); and (5) to continue to follow an open policy in promoting a high level of private sector participation.

The Ministry of Post and Telecommunication (MPTC) is in the process of further developing its infrastructure as well. In some subsectors, the private sector also has an important role in such areas as mobile phones and the internet.

In its current situation, the telecommunication sector should be backed by an

appropriate regulatory and supervisory system. It is necessary to develop transparent and fair rules such as those for entry into business and for tariff setting. In this regard, the organizational framework should specify separate regulatory and operational bodies, as such would allow the formulation of rules to proceed smoothly.

In electronic communications, there have been various attempts to develop a Khmer font, but until recently the different systems have been incompatible---i.e., to read and write electronic messages in Khmer, both sender and recipient must use the same font system.

3.8. Electric power generation

As earlier noted, Cambodia's development is partly hampered by high electricity rates when compared to its neighboring countries and by unstable electricity supply. The country needs an overall electricity supply plan. When drafting such, its government should not only look at generating thermal, hydro or mini hydro power for rural areas; it should also consider potential purchase from neighboring countries. The plan would need to be based on a realistic demand estimate for both urban and rural areas and take into consideration existing master plans and studies already conducted by various donors.

The state-run utility EDC anticipates a significant increase in overall power demand. Although the demand in the provinces is extremely low compared with that in Phnom Penh, there is still a need to consider electrification in the provinces, including the use of energy locally available, as improving the living standards in rural areas and boosting

agricultural production are crucial for the country's development.

Moreover, any situation where public facilities constructed via the Official Development Assistance (ODA) but could not be fully utilized due to the existence of unfavorable contracts or constraints imposed by IPPs should be avoided and rectified. Fairness and transparency are requisites when granting concessions, and all information on IPP activities that could affect any ODA project must be disclosed.

3.9. Irrigation system

Investments in irrigations are indispensable to the livelihood of an overwhelming 80 percent of the rural households whose primary sector of employment is agriculture. Agricultural production in Cambodia is still carried out under unstable conditions due to an almost complete dependence on natural conditions, especially rainfall. To sustain and stabilize agricultural production---which should be Cambodia's principal engine for poverty reduction and economic growth---the rehabilitation and construction of irrigation systems and supporting maintenance system are critical. Compared to other infrastructure such as roads, irrigation systems will never be usable without its proper operation and maintenance. Thus, it is important to put in place a nationally-funded, well-programmed and systematic maintenance of the facilities, where there is clear sharing of responsibilities among central and local governments, and water users. The action plan of the Ministry of Water Resources and Meteorology is, in fact, to improve the inventory of the existing irrigation systems; to rehabilitate the drainage and flood protection systems; to rehabilitate the existing irrigation systems and pumping stations, particularly in high

poverty incidence areas and along the border areas; and to create Farmer Water User Communities for all irrigation systems that have been completed.

4. ISSUES OF INFRASTRUCTURE DEVELOPMENT

In the development of infrastructure in Cambodia, there are some important issues to be addressed.

4.1. Resources

At present, the Royal Government does not yet have the sufficient financial, technical, and human resources necessary for infrastructure development. According to a study report by the World Bank, the benchmark value of road investment as a ratio of the magnitude of the national economy in developing countries is set at 3.5 percent of GDP, whilst that in Cambodia is presently at a minimal 2.4 percent of her GDP. Cambodia, therefore, requires and welcomes private participation in infrastructure (PPI), because this offers benefits to Cambodia in the financing, construction, operations, and management of infrastructure.

Regional cooperation can also help finance the development of infrastructural assets in Cambodia. In the Asian and Pacific region, cooperation in developing infrastructure has followed a two-track approach: On one hand, there has been cooperation in building cross-border infrastructure that exploits shared resources (such as energy and water), harmonizing cross-border rules and regulations, and learning from good institutional practices and policies. On the other hand, there has been cooperation in financing

infrastructure development.

4.2. Maintenance

Road maintenance is crucial as it impacts both economic development and even public safety. For instance, the lack of road signs creates problems such as road accidents, waste of the public's travel time, and even a waste of the national budget that should have been used to build new roads.

The financial framework for road maintenance work in Cambodia was established with the introduction of the value-added tax (Road User Special Tax) in 2002. However, the operation is far from satisfactory : It has not been properly and efficiently managed, and funds necessary for road maintenance are either improperly disbursed, delayed or totally postponed to the next fiscal year due to shortage of funds caused by poor management. For the tax itself, there are many defaults in the operation, application and disbursement methods. The cash flow is problematic because of the disconcerted communication among Ministry of Economy and Finance (MEF), Ministry of Public Works and Transport, Ministry of Rural Development (MRD), and authorities in charge. The resource was inappropriately applied and used; either it was affected by the incapability of executing agencies for road maintenance in terms of road budgeting or the allocation was transferred to expenditure types deemed more urgent/important by the Royal Government.

4.3. Vehicles and transport means registration

According to various reports, there persists a percentage of nonregistered vehicles, including boats and trucks, particularly in the rural areas and areas near the border. It is assumed that most of the nonregistered cars come from smuggling. A survey shows that about 60 percent of motorcycles, 20 percent of light vehicles and 20 percent of heavy vehicles are not registered. This causes a loss in national revenue needed for constructing and rehabilitating infrastructure. Moreover, the situation proves unfair to citizens who actually pay registration charges and car holding taxes honestly. If the registration system is improved and correctly administered, the annual revenue of the country will increase considerably.

Finally, since proper registration comes with safety checks, the safety of passengers and road users will be managed.

4.4. Private sector participation in infrastructure development

There are many reasons private investment in infrastructure will not significantly increase. Infrastructure subjects private investors to major risks because the investments are often large and their costs can be recouped only over long periods of time. In addition, infrastructure projects often provide public services that are considered essential to the population, including the poor. As such, the pricing of infrastructure services becomes a sensitive issue: The rate of return that is deemed attractive to private investors is weighed against a rate that is affordable to the general population. The investments are also largely sunk; the assets cannot be used elsewhere. These factors

make the returns from infrastructure projects vulnerable and uncertain. Therefore, attracting private investment in infrastructure often requires guarantees against such risks.

Although the private sector is crucial for infrastructure development, the public sector should still play the lead role. In Cambodia, cases where private sector participation involved corruption abound. For instance, corruption comes in when the private sector participates in BOT projects in strategic national highways, licensing land and BOT concessions without bidding.

4.5. Dealing with socio-economic impacts of infrastructure development

Another major social issue related to road development in Cambodia is the resettlement and compensation to residents who are displaced or affected by development projects. There is an increasing number of cases where the affected property owners were badly treated. According to Cambodia's Constitution, the affected property owners should be compensated with an agreeable value. However, there is no written laws or subdecrees on resettlement as a national policy. Legal regulations should be established as soon as possible so that authorities can implement such rules consistently, even for a national budget project. Public consultation, and grievance and monitoring mechanisms are as necessary as the proper implementation itself. Monitoring mechanisms can ensure not only proper implementation but also the rehabilitation of Project-Affected Persons' (PAPs) lives after the implementation.

Right of Way (ROW) management is also an issue that should be tackled in the future.

The focal point of past disputes on this issue centered on who could be compensated as per the declaration (Prakas) in 1999, which identified measures of eliminating illegal land encroachment. The 2001 land law, meanwhile, prevents new squatters in the ROW. Therefore, the ROW management should implement measures that will effectively identify the legitimate people who will be affected by the project so as to segregate these from the new squatters in the area. Otherwise, PAPs will be increased and the compensation cost will bloat.

During infrastructure construction, other issues that ought to be taken into account are health and safety protection measures, and environmental impacts such as air pollution, water pollution, noise, and vibrations. Therefore, an Environmental Management Plan (EMP) on how to monitor impacts before, during and after the construction works should be set in place.

The results of more than three decades of conflicts within the country and outside its borders have made Cambodia one of the most heavily landmine/UXO-contaminated countries in the world. Landmine and UXO contamination covers about 3,075 areas or 4,466 square kilometers, which is equivalent to about 46.2 percent of all of Cambodia's villages. There is, therefore, a possibility that landmines and UXOs exist around construction areas. To avoid accidents from such, these mines should be cleared in cooperation with the Cambodian Mine Action Centre (CMAC).

5. CONCLUSION

Infrastructure in Cambodia is still in poor condition compared with that of other countries in the region due to its war, poor master planning, and lack of maintenance. Roads are critical because an overwhelming share of the transported volume of passengers and freight are via land; other means of transportation only play a complementary role to road transport.

The inadequate physical infrastructure---road networks, electricity, irrigation and water systems, and port facilities---is a major barrier to economic development and poverty reduction in Cambodia. Hence, infrastructure networks should continue to be recognized as a priority. To do so would involve considerable investment, capacity building, new policies and institutional reforms. It is a challenge that goes beyond the public sector and needs to involve the private sector. This, in turn, will require new approaches to the provision of infrastructure services and new financing mechanisms. It will also require the support of development partners. Moreover, considerable progress has been made over the last decade or so in moving toward increasing intercountry road networks in Asia, and the basic framework for such plan is being set in place. Examples of its programs include the financing and development of domestic road transport networks that have regional importance; the creation of intercountry road linkage plans and establishment of their design standards (i.e., the Asian Highway); and the construction of new intercountry roads in the GMS.

Cambodia is still in need of huge investments for its infrastructure. Therefore, the government shall have a long-term infrastructure plan that would require the

participation of the donor community and the private sector, at least for the next few decades.

As mentioned earlier, 23 percent of the total amount of aid Cambodia obtained from 1999 to 2003 was used for physical infrastructure development. This shows how important infrastructure is in Cambodia's development, particularly in terms of its sustainable economic growth and poverty reduction plans. Infrastructure is also a requisite for national (and regional) integration and in balanced development of the country's many provinces.

6. POLICY RECOMMENDATIONS

To address the issues on Cambodia's infrastructure development, some vital policy recommendations should be taken into account.

6.1. General Recommendations

The Royal Government and donor community should continue to invest in road infrastructure, especially in rural areas. Technical assistance to improve road management in rural areas will help sustain road rehabilitation efforts. Donors should also continue to support the government's Power Sector Strategy by helping the country to access low-cost sources of electricity, including imports from Thailand, Laos, and Vietnam, and develop renewable power sources such as hydropower and thermal energy. In addition, the government should support the participation of the private sector in electricity generation. At the same time, the EDC needs to improve its management

efficiency. Technical assistance for the EAC to strengthen its role as the independent power regulator is also required to assure that electricity is supplied at reasonable prices. Continued rehabilitation of irrigation systems is needed to promote agricultural sector development. The effectiveness of Water User Groups to manage irrigation systems is vital for assuring the sustainability of irrigation rehabilitation. Finally, port facility improvements are needed to reduce the costs and lead times of importing raw materials and exporting finished products. Infrastructure improvements will require a significant amount of investment from both the government and donors and will have to be carried out over the next decade or two.

Transport infrastructure development should continue to focus on the rehabilitation of high-priority trunk and feeder roads and bridges as this will help realize the potentials of agriculture, tourism and trade in the rural areas. There is also the need to develop a comprehensive transport policy framework, addressing issues such as development of a balanced construction and maintenance program, increased involvement of the private sector, and financing of road maintenance and cost recovery mechanisms. In the area of institutional strengthening, the MPWT will have to formulate strategies to improve its capacity to plan, manage, and implement road operations.

Major investments should be directed toward improving physical transport infrastructure that links Cambodia with countries in the region, especially Thailand, Lao and Vietnam, as well as toward enhancing sea and air access to international destinations, especially China. Energy, ports and airports should be efficient enough to handle forthcoming increase in production and trade. All these could greatly reduce

transport costs and increase the competitiveness of Cambodian products in the export markets. However, the full benefits of such developments will only be realized if both people and goods can move across borders at minimal cost.

6.2. Specific Recommendations

6.2.1. Dealing with infrastructure development projects

1) Public consultation and awareness survey. Public consultation with the people around project sites should be conducted so as to properly disclose information about the project and to get the residents to understand both the positive and negative impacts of such project. Here, the procedure of the project, the legal framework, and the grievance mechanisms would have to be properly explained as most of the people will not know all the issues on land acquisition and resettlement. Such consultation should be scheduled several times as necessary, such as before the conduct of a public awareness survey.

A public awareness survey, meanwhile, is necessary since this is a tool that can confirm the affected citizens' basic agreement to the project. If many people oppose the project, the project should be reconsidered. In addition to their basic agreement to the project, the people's needs and social situations can be clarified through the survey.

The survey should be conducted at the cut-off date that will be declared upon the project's "go" decision. This is so as to protect those legitimately affected by the ROW and prevent t illegal squatters from claiming for compensation.

2) Resettlement action plan (RAP) and initial environmental impact assessment (IEIA). Resettlement is one of the most critical issues on road development. The formulation of a resettlement action plan (RAP) is crucial after the project implementation date has been decided. The plan's purpose is to protect the livelihood of PAPs and to maintain the same standard of living as before the project. In this regard, the RAP should cover the necessary measures and formulate a monitoring plan after the resettlement takes place. It is recommended that the government entrusts the monitoring to NGOs if such NGOs have good communication with the people and well understand the road project itself as well as the governmental system. In this case, a good partnership between the government and such qualified NGOs should be established.

The MPWT, as the project owner, has to finalize and submit the Initial Environmental Impact Assessment to the Ministry of Environment (MOE) for project approval. The necessary additional surveys, such as the household survey (forming part of the public awareness survey), should be conducted in an effective and prompt manner.

3) Land issues and de-mining. Pertinent land issues include land administration and land use control. Strengthening land administration (such as land registration, land transaction control, squatter control) is necessary for the Ministry of Land Management, Urban Planning and Construction (MLMUPC).. Land use control pertains to, among others, the development permission and land use plan created by the MLMUPC and other relevant agencies such as the Ministry of Agriculture, Forestry, and Fisheries (MAFF) for agricultural development, and the MRD for rural development.

Landmine and UXO contamination is not only a security-related issue but has significant economic implications as well, particularly on land distribution, security of poor farming households in remote areas, and infrastructure development. The government should therefore guide the de-mining activities in Cambodia in accordance with international security standards and obligations. Again, such activities should be cleared and closely coordinated with the CMAC.

4) Controlling pollution. Areas mainly affected by air pollution, noise and vibration are the densely populated and large-traffic volume locations. One of the mitigation measures against these impacts during construction is to apply methods that minimize noise and vibration. Anti-noise measures include the use of noise barrier fences. Vehicle smoke emission should be inspected to avoid adding to air pollution. On the other hand, since there are no legal criteria on vibration, establishing a legal criteria on vibration is a necessary first step.

The EMP is required to include monitoring mechanism plans before, during and after the construction works. The items that must be included in the EMP, which the contractor will need to implement, should be reflected in the tender documents. A baseline survey will be necessary during the basic design stage to allow for comparisons against the situation before construction. Key items that need to be monitored include air pollution, water pollution, noise, vibrations, accidents and the settlement process, which includes the negotiation process and assessing livelihood recovery after the resettlement. In addition, to improve the EIA/IEIA, legal frameworks such as technical standards and guidelines should be established. Law enforcement, including the

monitoring system, along with capacity building of governmental agencies concerned, should be strengthened.

Meanwhile, conventional EIA is not enough to reflect the long-term environmental impact of infrastructure development. Thus, Strategic Environmental Assessment (SEA), which takes into account the long-term ecological impact of infrastructure, can be an important policy tool in promoting sustainable infrastructure.

5) Improvement of traffic control and administration. In Cambodia, the traffic accident death rate stands out when compared to that of neighboring countries. Cambodia, after all, has a high rate of motorcycle accidents. An improvement of regulations and education of road users are necessary; so is the enhancement of infrastructure such as the provision of an exclusive traffic lane for motorcycles and traffic light facilities. Road safety and management should be enhanced by (1) the introduction of a driver's license system for motorcycles and of a car inspection system, reinforcement of the registration system, and expansion of the insurance regime and riding regulations for cow carriages within cities; (2) the provision of traffic lanes on suburban roads for exclusive use of motorcycles, reinforcement of the traffic signal system, implementation of full-size vehicle regulations within cities, and establishment of a sustainable public transport system, including bus and train operations; and (3) daily inspection and repair of roads; and (4) education of road users through the media and schools.

6) Human capacity building in infrastructure development. Infrastructure is more than hardware. It includes human capital and social infrastructure.⁴ Human resource development is essential for infrastructure building and maintenance. Human capacity building as part of social infrastructure development in Cambodia is critical in enhancing economic performance and productivity.

A major constraint to attracting foreign direct investment (FDI) flows in Cambodia is the shortage of skilled labor. The private sector as well as FDI can generally help upgrade professional skills in host countries. It can provide efficient supply chain management, plus there is the ripple effect of technology diffusion. For the private sector to participate fully, a climate supportive of long-term commitment must be apparent in terms of policy framework, attitude and practice. To mobilize the private sector to contribute to human capacity building in Cambodia, there is a need to institutionalize the partnership between the public and private sectors. The government should facilitate the activities of private investors (domestic as well as foreign). In the area of management education and vocational training, the private sector should be involved in funding and supporting centers of excellence, which yield direct benefits to

⁴ Infrastructure can be divided into economic infrastructure and social infrastructure. **Economic infrastructure** includes transport facility, villages electrified, irrigation, electricity, special economic zones, telephone, Internet, banks, and so on. They are certainly beneficial for “crowding in” of both domestic and foreign private investment in the concerned geographical region, contributing to economic growth. On the other hand, **social infrastructure** facilities through enrichment of human resources in terms of access to education, health, housing and drinking water improve the quality of life. These factors are primarily responsible for higher concentration of better human resources, which help improve productivity of labor in an essential way.

business. Involving the private sector in formulating training strategies and curriculum designs can ensure that human resources development meets the demand of companies and labor markets.

In addition, development partners should facilitate capacity building in Cambodia in the application of new technologies, support the development of micro, small- and medium-size enterprises, and encourage linkages between these and foreign enterprises. Foreign investors, to be socially conscious, should integrate with the local community, establish corporate citizenship, and engage in human resources development.

7) Improving an enabling environment for infrastructure development.

Infrastructure improvements require the intervention of the government and donors, and private sector participation through various models such as the BOT has to be encouraged. Private sector involvement in infrastructure development does give rise to concerns: ensuring access to the poor, giving away national assets, bogus investors, and negative impact on market structure and competition are some of these. The private sector also has concerns of its own: Investment risks can be high and rates of return low. New approaches and innovative techniques can help overcome each other's concerns. To realize the potential of private sector involvement in infrastructure development in Cambodia, the government needs to put in place the appropriate enabling policy environment and make the necessary long-term commitment to infrastructure development.

A prerequisite for successfully attracting private investment in infrastructure projects is

a sound regulatory and institutional framework. Policies should facilitate free entry to infrastructure development to make the market competitive.

Competition in the market can discipline investors. The initiation of pro-competition policies or laws helps increase the level of rivalry among service suppliers in sectors such as electricity, telecommunications and the internet. Such increased competition would lead to lower prices and improved services. The existence of right laws would ensure that there is no collusion or cartel formation among service providers. In addition, a competition policy should be in place to avoid public monopoly from being replaced by private monopoly.

On the issue of investment risk, there are different ways to reduce it. They include improving the regulatory framework and business facilitation, and bringing in an investment consortium. If the enabling environment is inviting and the government commits innovative risk management, the potential for private investment in infrastructure will exist increasingly in Cambodia.

Regarding the return to investment, management contracts as an instrument can reduce costs, lessen leakage in production and distribution and lower charges to the end user. Cost recovery through the “consumer pays principle” can make economic sense. However, the consumer pricing of infrastructure services can be a challenge for the government because it can affect the poor and the poverty reduction strategy. The cost of infrastructure development is normally borne by the end user of the services. If the consumer cannot afford the service charges, the government and development partners

should allocate funds and development assistance to support service delivery systems targeted for the poor, as part of the government's commitment to poverty alleviation.

Foreign direct investment policies are attractive, but slow implementation of policy reforms is pervasive. The private sector and civil society can advocate policy reforms, but to be effective, they need to be empowered and placed on par with the state through certain mechanisms such as: (1) effective private sector representation and participation on infrastructure-specific regulatory boards and management institution; (2) public-private interagency committees within government line ministries, private sector associations, and government officials can review policy implementation over agreed time periods; and (3) joint government and private sector seminars focusing on information dissemination, brainstorming, and review of policy implementation. Therefore, policy improvements are needed on three broad fronts: Efficiency issues in the management and reform of the public sector; governance issues of institutional transparency, reliability and accountability; and private sector's willingness and unity of purpose in public-private partnerships. These will assure essential benefits: good and high-level policy formulation and implementation, institutional reliability, and effective private sector development and participation in infrastructure development.

6.2.2. Financing of infrastructure maintenance and development

In Cambodia, the maintenance of existing infrastructure assets should be the highest priority, as future rehabilitation or reconstruction costs will far exceed the cost of timely maintenance. However, both maintenance work and reconstruction are already the government's priorities

A strong political case needs to be made for increasing the funding for infrastructure maintenance (as deteriorating infrastructure still imposes large resource costs), and of infrastructure development. The pros and cons of taxation of road, rail, air and water transport users to cover the marginal cost users impose on society (e.g., road deterioration, traffic congestion, and environmental costs) should be explored on a sector-by-sector basis. As the Royal Government currently does not have enough financial, technical and human resources, private participation in infrastructure development is required and welcomed.

Generally, well-structured infrastructure projects grounded on an acceptable legal framework and based on documentation conforming to international standards can be financed in countries with low income or high risk, or both. Nevertheless, mobilizing foreign private finance will require innovative financing methods. It is therefore of equal importance to earn investors' confidence in the chances of success of projects and in the transparency and fairness of the procurement as well as implementation processes.

Meanwhile, private financing of infrastructure has a key role in public infrastructure. For example, an experimental project where partnership schemes between the public and private sectors is under way in Cambodia (i.e., Phnom Penh International Airport). One constraint to foreign investment in Least Developed Countries (LDCs), especially in Cambodia, is the size of the market. Regional and subregional economic cooperation and integration (e.g., ASEAN, GMS) can help overcome the problem of market size,

attracting private sector to invest in infrastructure. In the meantime, infrastructure building can facilitate regional and subregional economic integration, particularly if the parties involved are from the private sector. Therefore, infrastructure networks should take into account the regional context, where regional networking is feasible and beneficial to all participating countries. The international community should facilitate regional cooperation with the aim to link Cambodia's electricity, transport, and telecommunication networks with those of neighboring countries. It is particularly vital for Cambodia to engage effectively in regional and international trade, and tourism.

Therefore, institutional arrangements to promote private sector participation need to be promoted, including the setting up of public-private partnership (PPP) units and the regional institutional networks of such units. The PPP in infrastructure development in Cambodia is considered an important policy objective. Justifications for tapping private sector participation range from its potential as a source for financing, its efficient management capability, and new technologies it possesses.

However, because there are externalities associated with transport and communication services and Cambodia's private sector is relatively underdeveloped, the government is still required to play a major role in the provision of economic infrastructure. The government has to encourage private sector and community participation in infrastructure. Its policy framework should be conducive and should identify legal and regulatory rules for PPIs. To determine the role of the private sector in the provision of infrastructure, it is critical to ensure that the decision-making process is transparent and the public interest duly protected.

To improve the governance of PPI project transactions and to maximize the extent of PPI in Cambodia and the efficiency achieved by Cambodia, four guiding principles should be followed: (1) *Responsibility* means that the roles of each public entity have to be clearly defined so that there is no uncertainty about who is responsible for each step; (2) *Accountability* means that each responsible party must follow prescribed procedures with provision made for the rapid resolution of disputes; (3) *Predictability* means that the procedures have clear guidelines and criteria so that the outcome of each step is not subject to arbitrary or political decisions; and (4) *Transparency* means that the rules and procedures should be followed in an open and fair manner, and the necessary information should be made available to all.

In spite of best efforts, private sector participation in infrastructure development in Cambodia---especially in providing access to remote, sparsely populated and mountainous areas---would be difficult to obtain. Therefore, the international community should set up a special fund for infrastructure development to assist Cambodia. It should provide a higher level of financial resources to Cambodia to meet the latter's infrastructure needs. It could also encourage private sector participation in infrastructure through co-financing and play a catalytic role in attracting foreign direct investment (FDI). Furthermore, the international community and donor agencies should also provide technology and technical assistance for the development of human resources in Cambodia.

Another way by which the Cambodian government can attract financial resources is to

create a securities market. It has in fact planned to establish such at the end of 2009. In the securities market, not only the government, but also the private companies can issue bonds and stocks to the public to raise capital for infrastructure investments. Promoting the financial sector, including insurance sector, banking sector, and securities market significantly enhances Cambodia's infrastructure development.

To finance road construction and maintenance works, the government should secure necessary funds through improvement of defaults in terms of levying, operation and disbursement method by (1) allocating a small percentage of the tax revenue from import of gasoline and diesel to financing of road maintenance; and (2) allocating a part of the road user tax to road construction and maintenance works through the enforcement of a tax system on car registration.

6.2.3. Administration of agencies responsible for physical infrastructure

Many agencies in various ministries are involved in physical infrastructure development. The capabilities of many are limited, due to financial and human resources constraints and systemic issues. Some of the administrative systems in the region are of an extremely hierarchical nature. Much remains to be done to improve Cambodia's administrative, legal and regulatory institutions, before they could gain investors' confidence and elicit private sector participation in infrastructure investment. Therefore, addressing governance issues is a major priority of the government. Nevertheless, social networks can be utilized for awareness creation and better participation in infrastructure development, particularly on the local level.

Recently, many countries have increased local involvement, for example, in the construction and maintenance of rural roads. Also, there appears to be a general trend toward decentralization of infrastructure facilities. The creation of a new authority such as “Mass Transit Authority” or “Transport Authority” should be considered.

To eliminate problems caused by inefficient implementation relating to institutional, traditional and technical weaknesses in road administration, some measures should be taken: (1) prepare guideline for road maintenance management; (2) implement by project cycles, which consists of maintenance preparation, implementation, operation, and evaluation, all identified by the National Road Maintenance Committee (NRMC); (3) develop capacity of local contractors and road authorities; (4) achieve provincial capacity development and decentralizing; (5) be transparent in prioritizing the project planning; (6) foster collaboration between the MRD and MPWT in the technical and physical aspects of road maintenance so as to assure that all authorities responsible for managing the road network in Cambodia do work together; (7) improve the project’s cash flow despite weak communication and coordination among related ministries; (8) strengthen financial auditing to guarantee a sound budget/expenditure management; and (9) strengthen technical auditing to assure the quality of output. It is worth noting that the NRMC was established to maintain and identify all standards, design methods, and quality control of projects.

Encouraging small-scale private providers. Small-scale providers of infrastructure services should be encouraged, or at the very least, not be constrained or regulated out of business. Unregulated small-scale providers commonly emerge in conflict-affected

countries to meet the pent-up demand of poor, rural, and peri-urban communities, especially in electricity and water supply. The small-scale providers can play a key role in the absence of established public utilities or major private operators. Their role can be especially important in post-conflict countries, where large-scale electricity projects, for example, typically take six or seven years to materialize. The government's success in handling such providers can prove crucial to poor and isolated communities.

6.2.4. Improving regional cooperation and integration

Cambodia shares borders with three countries: Thailand, Vietnam, and Laos. Its current trade in goods with its neighboring countries, especially with Vietnam and Thailand, is substantial. Furthermore, some of Cambodia's exports are transited through Vietnam. Roads connecting the neighboring countries are economically vital. Thus, in addition to domestic road networks, priority should also be given to building roads between the three countries through various border-crossing points (See the table below). Transporting goods and person through those crossing points is not only beneficial to Cambodia's trade, but would also speed up the integration of the region because all four countries are already members of the ASEAN and GMS.

6.2.5. Long-term transport infrastructure development plan

Transport infrastructure development requires long-term policy measures. Cambodia's needs to set priorities for policy measures with the following perspectives: Policy measures should promote the ongoing restoration work as these are essential for both mid- to long-term initiatives.

Cambodia is now moving from the stage of rehabilitation and reconstruction to the next stage: full-fledged development. In this transitional period, the country needs to both formulate a comprehensive transportation scheme consistent with the five-year Socioeconomic Development Plan and other plans, and to carry out programs based on this transportation plan. This is necessary if Cambodia wants to develop its transport infrastructure both efficiently and effectively. At the same time, it needs to improve coordination among different modes of transportation.

It is essential to set out the framework of a comprehensive transportation plan before drafting a mode-specific scheme. It is also necessary for the Cambodian government to authorize the implementation of such a comprehensive plan. In addition, such a plan needs to consider key international as well as domestic transport systems, as Cambodia is in the center of Indochina.

The government needs to secure equipment and materials, develop human resources and improve technical capacity for the transport facilities that it maintains, manages, and operates. Currently, inadequate communications systems hamper the government's activities for maintenance, management and operation of transportation infrastructure. However, as restoration and construction work for telecommunications facilities progresses, Cambodia has to take advantage of this progress and improve such communications systems by, for example, creating the necessary telecommunications networks for transportation infrastructure. This action may be part of the Cambodian government's initiative in developing its information infrastructure.

6.2.6. Telecommunications infrastructure

Telecommunications infrastructure development requires similar policy measures as those for transport infrastructure development. In addition, the MPTC has converted state-owned enterprises under its management into public corporations in 2000. With this new form of organization and a new management method, the MPTC should promote operational efficiency in such corporations. This is a tall order for such public corporations, as this requires them to achieve the seemingly incompatible objectives of keeping user charges low and offering services in less profitable rural areas, while rapidly modernizing and expanding services. The expansion of services to rural areas is crucial for rural development.

6.2.7. Power Infrastructure

The price of electricity in Cambodia is very expensive compared to those in the region. Cambodia now needs to formulate a long-term plan for the energy sector, especially on how to secure stable power resources and electrify rural areas.

The role of the private sector in developing electric power resources should not be overemphasized, as the World Bank suggests. The World Bank's suggestion may be appropriate for Bangkok and some other key cities in Southeast Asia where the electric power market is well developed, but not so for Cambodia. In fact, the high cost of purchasing electric power from Cambodia's IPPs is hampering demand in Phnom Penh and other major urban cities. Cambodia thus needs to dip into its public funds for the

development of power resources across the country, with special consideration to hydroelectric plants. The national grid network should be built across the country to improve power distribution. At the same time, Cambodia has to study how to use its public funds appropriately.

REFERENCES

ADB. 2005. Proposed technical assistance to the Kingdom of Cambodia for the restructuring of the railway in Cambodia (Financed by the Government of France).

ADB; JBIC; and World Bank. 2005. *Connecting East Asia: A New Framework for Infrastructure*.

Council for Development of Cambodia (CDC).

www.cambodiainvestment.gov.kh/?q=ii_infra [online access].

Economic Institute of Cambodia (EIC). 2007. *Export Diversification and Value Addition for Human Development*. Cambodia.

GMS Rehabilitation of the Railway in Cambodia. 2007. Loan agreement between the Kingdom of Cambodia and ADB.

Japan International Cooperation Agency (JICA). 2006. *The Study on the Road Network Development in the Kingdom of Cambodia*. Cambodia.

JICA. 2002. *Country Study for Japan's Official Development Assistance to the Kingdom of Cambodia*. Japan.

Kov Phyrum; and Hean Menghong. 2007. Power sector in Cambodia. *Economic Review*. Vol. 4, No. 1. EIC, Cambodia. Pp.8-11.

Kov Phyrum and Va Sothy. 2007. GMS program and its economic corridors: How can Cambodia benefit from this sub-regional cooperation? *Economic Review*. Vol. 4, No

- 1, EIC, Cambodia. Pp.2-7.
- Kov Phyrum. 2007. Rural infrastructure development. *Economic Review*. Vol. 4, No. 1, EIC, Cambodia. Pp.12-15.
- Mingsarn Kaosa-ard. 2006. Tourism: blessings for all? *Journal of GMS Development Studies*. Vol. 3, No 1. Pp. 1-24.
- National Institute of Statistics. 2007. *Statistical Year Book 2006 Cambodia*.
- Royal Government of Cambodia. 2002a. National poverty reduction strategy 2003-2005. Cambodia.
- _____ 2002b. Socio-Economic development priorities and the official development assistance needs. Cambodia.
- Royal Government of Cambodia. 2006. *National Strategic Development Plan (2006-2010)*, Cambodia.
- Royal Government of Cambodia. 2006. Second five-year socioeconomic development plan 2001-2005, Cambodia.
- Royal Government of Cambodia. 2007. Annual progress report 2006 on national strategic development plan (2006-2010). Cambodia.
- The Public-Private Infrastructure Advisory Facility and the World Bank Group. 2002. *Private Solution for Infrastructure in Cambodia: A Country Framework Report*. Washington, D.C.
- World Bank. 2007. *Sharing Growth: Equity and Development in Cambodia*.