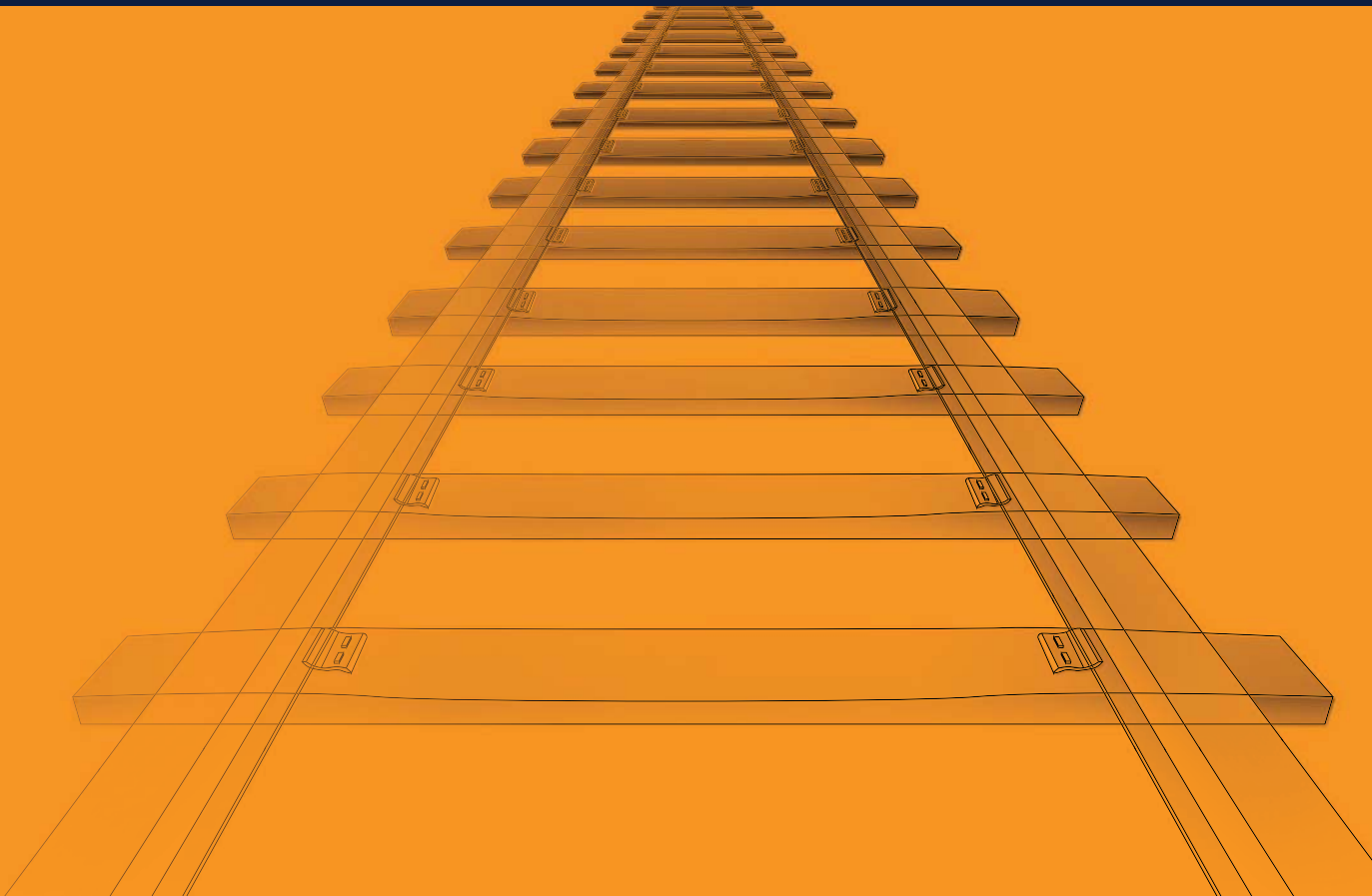




ADB

CONNECTING GREATER MEKONG SUBREGION RAILWAYS

A STRATEGIC FRAMEWORK





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August 2010

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Printed in the Philippines.

ISBN 978-92-9092-053-3
Publication Stock No. RPT102079

Cataloging-In-Publication Data

Connecting Greater Mekong Subregion railways: A strategic framework
Mandaluyong City, Philippines: Asian Development Bank, 2010.

1. Greater Mekong Subregion. 2. Railway network. I. Asian Development Bank.

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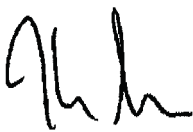
Foreword

This strategic framework for connecting Greater Mekong Subregion (GMS) railways is the first step in developing and implementing an integrated railway system in the subregion. All the GMS countries have independent plans to develop their railways. Yet all desire to see an integrated system that would move their freight and passengers seamlessly around the subregion and beyond.

To date, the individual countries have focused on the investments needed for line construction, with little attention to the other aspects of infrastructure, let alone the many requirements of cross-border traffic—such as compatible and mutually recognized immigration, customs, and health clearances; technical and operational standards; and/or procedures and facilities, such as axle change at borders—that also need to be addressed.

This strategic framework, based on a study requested by the GMS countries, develops a practical approach to GMS railway integration, provides the GMS countries with an initial framework for achieving integration and interoperability, identifies priority initiatives, builds a platform for further dialogue and discussion between and among GMS countries, and provides a context for evaluating future projects.

We hope that the framework will set the stage for the GMS countries to work together on developing common or harmonized standards and procedures for their railways that will enable greater connectivity between the countries and, ultimately, their greater economic growth.



Kunio Senga
Director General
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Abbreviations

ADB	–	Asian Development Bank
CBTA	–	Cross-Border Transport Agreement
GDP	–	gross domestic product
GMS	–	Greater Mekong Subregion
Lao PDR	–	Lao People’s Democratic Republic
PRC	–	People’s Republic of China
SKRL	–	Singapore–Kunming Rail Link
TSSS	–	Transport Sector Strategy Study





Introduction

The countries of the Greater Mekong Subregion (GMS)—Cambodia, the People’s Republic of China (PRC), the Lao People’s Democratic Republic (Lao PDR), Myanmar, Thailand, and Viet Nam—have expressed their desire, through the GMS Economic Cooperation Program, for better transport connectivity to improve the environment for trade. The GMS Transport Sector Strategy Study (TSSS), approved on 20 October 2004, developed a strategy and plan for further integration of transport in the GMS until 2015; these were endorsed by the GMS governments at the summit meeting of heads of government on 4–5 July 2005.

One of the key recommendations of the TSSS was to widen the GMS transport strategy to include not only roads but also railways and other modes of transport. The TSSS performed a subregional traffic demand study, which confirmed that there is significant demand for subregional railway services. The report also noted that, beyond preparing the Singapore–Kunming Rail Link (SKRL) plan, which was formulated in the early 1990s, no comprehensive subregional railway planning has been undertaken. At the third GMS summit in March 2008, the GMS heads of government noted the need to look into developing the GMS railway network to enhance connectivity between

the six countries and to include railways in the scope of GMS cooperation.

The railways in the GMS have developed independently over the course of a century and are today, with the exception of a connection between the PRC and Viet Nam, a collection of national railway networks that do not interconnect.¹ Each national railway has developed into a unique system with its own standards and procedures (Figure 1). In view of escalating subregional trade, growing concerns over climate change and, more recently, sharply fluctuating fuel costs, the GMS countries have accelerated their plans for upgrading their national railway networks and for interconnecting these by constructing new railway connections.

The TSSS recommended that a comprehensive and detailed railway study be undertaken to consider the medium- and long-term requirements for a GMS railway system beyond the scope of the SKRL plan. The proposed study would consider route structure, quality of service, operating parameters, and financial and economic viability, and take into account technological developments since preparing the SKRL plan. The study would provide the GMS countries with a strategic framework based on a comprehensive analysis of options to integrate their railways by interconnecting and integrating the national railway systems, and an assessment of the resources required. The study was carried out in 2009; the first draft report was discussed at the 13th Meeting of the Subregional Transport Forum in October 2009, after which further consultations with GMS countries were conducted and the report finalized.² The strategic framework is a condensed version of the report and was endorsed by the 16th GMS Ministerial Conference in August 2010.

Successful interconnection will require that the multitude of national technical standards and operational procedures converge toward common standards to enable trains to flow seamlessly between the national railway systems. Interconnection will also require entirely new procedures be introduced in most countries, such

as ticketing and sharing the payment for international passenger travel among the national railways along the route.

In a diverse environment such as the GMS, integration must start with identifying an initial common framework for interconnection that would enable all national railways to join the GMS railway network at reasonable cost and within a reasonable time. The agenda for railway integration is huge, but the GMS countries have some advantages that can ease and speed up the process. Some of the national railways (in the PRC, Thailand, and Viet Nam) already operate international connections, which provide a useful starting point for establishing international connections within the GMS.

The GMS economies are developing rapidly, and all countries have plans for upgrading their transport infrastructure. Most of the national railways are already undergoing modernization, which could ease the introduction of institutional and operational integration; and many of the agreements that are required for cross-border traffic are common for all modes and have already been established under the GMS Cross-Border Transport Agreement (CBTA). Adapting these agreements to railway traffic would be relatively easy and could give impetus to integrating railway traffic in the GMS. Furthermore, the additional costs of adapting existing and future railway plans to a regime of common railway standards would be relatively low compared with the cost of integrating mature railway systems.

The GMS railways should be systematically designed by incorporating other supporting modes of transport, such as roads and waterways together with main gateways for each route. This would enable multimodal transport management to be put into practice, creating the most efficient and seamless connections.

This strategic framework for connecting GMS railways is the first step in developing and implementing a seamlessly integrated railway system in the subregion. The following chapters provide information on the present status and planned

¹ A railway connection exists between Thailand and Malaysia, which is not a member of the GMS. Thailand's railway network also includes one line that extends 3.5 kilometers across the Mekong Friendship Bridge to Thanalaeng in the Lao PDR, but there is no national railway network in the Lao PDR.

² The final report of the study is available as ADB. 2010. *GMS Railway Strategy Study*. Manila.

Figure 1: Map of Railway Lines in the Greater Mekong Subregion, Present and Under Construction



developments of national railways in the GMS and the actions needed to enable them to become more efficient and reliable. The economic and trade outlook for GMS countries is described next, which provides the basis for projections and an economic analysis of freight and passenger traffic on four potential routes to link GMS countries. Finally, a strategic framework is presented that will help make connecting GMS railways a reality. The key success factor for this plan will be the efficiency of the cross-border transport and trade facilitation, which includes rules and regulations, customs procedures, and

freight/passenger transfer facilities at the borders between the countries.

The next steps will be (i) conducting national studies to determine how each national railway can move most efficiently toward meeting the requirements set out in the strategic framework and thereby be brought into the common GMS railway network, (ii) implementing the required physical interconnections, and (iii) establishing effective cooperation at many levels between the national railways to enable increasing integration in the future.



Status of Greater Mekong Subregion Railways

The GMS countries are all considering ambitious plans for their railways, and the PRC, Myanmar, Thailand, and Viet Nam are already making huge investments in new lines or in upgrading existing lines. The PRC is investing in high-speed rail while Thailand and Viet Nam are considering such investments. Following are brief summaries of current and planned developments in the national railways of GMS countries.

Current and Planned Developments

Cambodia

Cambodia privatized its railways in 2009, and the entire railway system is being rehabilitated at a cost of \$140 million, financed by the Asian Development Bank (ADB) with cofinancing from Australia, Malaysia, and the Organization

of the Petroleum Exporting Countries (OPEC) Fund for International Development (OFID). A feasibility study financed by the PRC is being prepared for a line connecting Phnom Penh to the Viet Nam border.

People's Republic of China

The PRC is planning to invest about CNY600 billion in railways each year from 2010 to 2012. The total investment in railways in the 11th Five-Year Plan will be CNY1,870 billion (\$267.1 billion). As part of this investment, the PRC has started an \$11.8 billion program to expand the capacity of the railway connections between Kunming and Nanning, and new lines, including one to the Viet Nam border and another to the Myanmar border, are under way. A line to connect to the Lao PDR is under consideration.

Lao People's Democratic Republic

A new train service operating from Bangkok over the Mekong Friendship Bridge to Thanalaeng opened in March 2009. Trains are operated by the State Railway of Thailand supervised by the Lao Railway Authority. A feasibility study for adding a 9-kilometer (km) link from Thanalaeng to Vientiane was recently completed, and other new connections—to the PRC, Viet Nam, and Thailand—are being considered.

Myanmar

Myanmar has undertaken a major new line construction program to enhance its domestic rail network, adding 2,000 km to the existing 7,000 km of tracks. Feasibility studies for international links to the PRC and Thailand have been prepared in recent years.

Thailand

The State Railway of Thailand has completed a track upgrading program on 1,539 km of the country's 4,042-kilometer rail network, increasing axle loads and speed. Another 586 km are scheduled to be upgraded in the next phase. Plans are being considered for extending the length of double tracking, developing high-speed train lines, and constructing new lines, some of which could link to the Lao PDR and onward to Viet Nam. The Government of Thailand also plans to

implement policy measures aimed at encouraging a shift from road to rail.

Viet Nam

Viet Nam has a master plan, approved in 2002, for modernizing its railway network, including extensive rehabilitation and upgrading of the line from Ha Noi to Ho Chi Minh City, and upgrading of the line from Ha Noi to Dong Dang, which links to Nanning in the PRC. Other planned international links are to the Lao PDR and Cambodia. Concurrently, Viet Nam is assessing the feasibility of developing a high-speed railway system between Ha Noi and Ho Chi Minh City. Viet Nam Railways has, in recent years, been converted to a corporation; private train companies also exist, providing passenger and freight services.

Assessment of Greater Mekong Subregion Railways

Capacity Expansion

As the summaries above show, GMS countries are investing (or plan to invest) heavily in track upgrading and in the construction of new lines. However, much less attention is being paid to developing rolling stock, signaling, telecommunications, and train control systems, and addressing operational, organizational, and institutional barriers to improving the performance of the national railway systems—issues that invariably are raised by current and potential railway users and by potential private sector railway investors. An example is inadequate availability and reliability of locomotives and rolling stock, which is a barrier for freight shippers considering using railway instead of road.

Planned new lines will require additional locomotives, wagons, and coaches to meet projected freight and passenger demands, but these are not available. Shortages are already occurring in Myanmar, Thailand, and Viet Nam because many of the locomotives that are now in service are old, fuel-inefficient, and rapidly becoming irreparable, while wagons are generally in poor condition and spare parts in short supply. The condition of coaches is basic except for upper-class travel coaches and some refurbished coaches used in Viet Nam on premium services.

Locomotive and rolling stock maintenance facilities also need to be substantially upgraded and modernized to service new and additional rolling stock adequately.

For present national and future GMS railway systems, investments in new communications and signaling systems and in automated train control have huge potential to eliminate bottlenecks. Often, the introduction of modern communication technology, combined with the construction of more (or longer) passing loops, is an alternative to double tracking (extensive double tracking is being considered in Thailand, for example) and would be much less costly.

Human Resource Development

The majority of staff in GMS railways are dedicated and committed, and work long hours for low pay. However, the needs for pay reform, skills upgrading, and training in modern railway practices and on the use and application of the latest technology have been neglected.

Management Information Systems

Management information systems in GMS railways, where they exist, are mainly used for financial management; they are not intended to provide managers with the real-time information necessary to manage a transport business efficiently. Railway performance monitoring systems for this purpose have been implemented elsewhere, and their application in GMS railway operations should be explored.

Cost accounting systems for setting tariffs and fares, in response to the profitability of services, are lacking in all GMS railways. While this is understandable (because governments usually set tariffs on a public utility basis), proper pricing knowledge is an essential ingredient for efficient railway network operations. Similarly, infrastructure and rolling stock repair and maintenance histories are generally not readily available, making it difficult to plan and schedule appropriate maintenance activities. Under conditions of scarce financial resources and difficult cash management, this information is critical.

Other areas where information technology improvements would be beneficial, especially in regard to enhancing the potential for interconnectivity, are automated regional ticketing systems, shipment tracing, and electronic data interchange.

Railway Organizations, Institutions, and Regulations

A dialogue to chart the best course for the future involving all stakeholders—GMS railways, responsible ministries, donors, unions, users, and potential investors—should begin as soon as possible.

With the exception of the railway in Cambodia, which has been concessioned to a private operator, all railways in the GMS are state-owned and primarily depend on state or donor funding for investments in infrastructure, locomotives, and rolling stock. The state also covers operating losses.

Governments often blame their railway organizations for the poor financial results and inefficiency of the railways. However, GMS railways are burdened with outdated legislation, operating rules, and procedures; they have too many employees; have limited flexibility to set tariffs and fares; and have limited freedom to manage and develop assets. Governments need to modernize their railway regulatory and legislative environments to enable their railways to become more competitive and efficient.

Only the PRC and Viet Nam have coherent national rail sector strategies. The other countries have plans for their railways, but the overall objectives, investment priorities, and strategies are not clearly defined and approved by the respective governments.

Cambodia has formed the Railway Department in the Ministry of Public Works and Transport to oversee the concession of its railway and manage future railway development policy. Cambodia will need to decide how infrastructure and operations will be provided on the planned new line from Phnom Penh to the Viet Nam border.

Efforts have been made by the PRC Ministry of Railways to encourage the formation of joint-venture railways between the Ministry of Railways and local government to reduce the level of operating subsidies through more appropriate pricing of services and by encouraging nongovernment investment in infrastructure and service provision.

The Lao PDR, which is considering major investments in railways, has neither a regulatory regimen nor a railway operator.

In Thailand, despite government policy that encourages private participation in the rail sector and the shift of freight traffic from road to rail, little progress has been made, mainly due to the resistance of railway staff unions. Shippers also report that the railway is unable to supply the locomotives required to service their needs adequately. The government is planning to separate infrastructure from operations; this will require the development of an infrastructure charge regime.

Corporatization of Viet Nam Railways has been ongoing for the last decade; the operation and maintenance of infrastructure are now separate from passenger and freight train operations. New systems to improve financial management and the foundation for setting infrastructure access charges are being introduced. However, Viet Nam's Railway Reform Law, introduced in 2005, has not yet become the catalyst envisaged for attracting investment by the private sector in the construction and maintenance of infrastructure or operation of freight trains.

Despite the progress made in the GMS on improving railway organizations to date, customer responsiveness of railway organizations remains weak. Commercial departments cannot respond to customer needs because they have little or no control over pricing and there is little they can do to modify services because the organization's orientation is to provide trains, not to serve the needs of customers or to generate profits.

To become financially viable, the railways must generate sufficient profit to sustain their operations and investments, and private investment must be encouraged. But GMS railways have limited capacity to increase revenue or to raise capital, and the private sector is not interested in investing without reforms enabling more transparent and responsive regulatory regimes. These changes cannot take place in the GMS without restructuring the railway sector, which would provide a means to expand capacity and competitiveness, both of which help improve financial performance.

A dialogue to chart the best course for the future, involving all stakeholders—GMS railways, responsible ministries,

donors, unions, users, and potential investors—should begin as soon as possible. This dialogue could be accomplished through a series of regional forums or workshops on best practices. Convergence of opinions may sometimes be difficult to achieve but, at least, the dialogue will have started and, if consensus emerges, it will reflect the national objectives of the GMS countries.

Regulatory and legislative reforms must be implemented before restructuring the sector or it will fail. New institutional arrangements will be needed to address such matters as railway autonomy, tariff deregulation, subsidies for imposed public service obligations, and operating and safety standards.

Interoperability

A working group should be set up to define and agree on a set of minimum technical standards.

Technical standards vary throughout GMS railways. A working group should be set up to define and agree on a set of minimum technical standards. This working group would, for example, define dimensions of containers that could be carried on the network, the maximum weight of locomotives, the maximum gross weight of wagons, and the structural gauge for tunnels and bridges. The results would help facilitate cross-border movements and reduce construction costs. Eventually, it is possible that entire trains from one country could run over another country's railway network if common operating and safety standards are developed and implemented.

The PRC is constructing standard-gauge lines to the borders of the Lao PDR, Myanmar, and Viet Nam. But the rest of GMS railways are meter gauge, which introduces a "break of gauge" for connections to the PRC. Various technical solutions exist to offset the need to reconstruct lines to standard gauge, while maintaining the flow of traffic, including transshipment facilities, bogie changing, trains equipped with variable-gauge axles,³ and dual-gauge tracks⁴ as already used in Viet Nam on the line connecting Dong Dang to Nanning.

³ The use of trains with variable-gauge axles enables wagons to be pulled along a special transition track at reduced speed. During the process, the distance between wheels is adjusted from one track gauge to another.

⁴ Two different track gauges on a single-track foundation through the insertion of a third rail.

There will undoubtedly be increasing demand for an efficient Greater Mekong Subregion rail network to allow trade between the countries to prosper without experiencing delays due to transport bottlenecks.





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While a consistent gauge throughout the GMS railway network would be ideal, break of gauge occurs mostly at border points where trains are required to stop for customs inspections and sometimes to change locomotives or crews, etc. If transshipment and bogie exchange facilities are well designed and operated, the processes can be completed during a train's scheduled stop. In addition, the majority of time-sensitive traffic is containerized cargo which, by nature, is oriented toward easy transshipment.

Facilitation of Cross-Border Traffic and Passenger Travel

Technical assistance for the GMS railways to develop and implement CBTA protocols specific to rail is needed.

To be truly interconnected, GMS railways will first need to agree on technical protocols and then proceed to harmonize cross-border procedures bilaterally. The CBTA exists to accommodate this. The focus to date has clearly been on facilitating road traffic, but there is no reason that rail should not achieve Protocol 2.3.5.1.6 of the Vientiane Action Programme, 2004, wherein direction was given to reduce the target time for release of any container to 30 minutes.

Technical assistance for the GMS railways to develop and implement CBTA protocols specific to rail is needed. This technical assistance needs to have a particular focus on expanding the use of electronic data interchange. Technical assistance should also be made available to countries to assist in concluding bilateral cross-border rail transport agreements and in harmonizing customs procedures specific to rail.

Connections with Other Modes

Careful consideration should be given to investment in efficient rail-road and rail-port interchanges and to identifying optimal locations for these interconnection points.

The GMS railway network needs efficient interconnections with other modes, especially road and inland waterways, for maximum connectivity. The network should be viewed as part of a larger, seamless multimodal network. Thus, in the development of new lines and in the upgrading of existing lines, careful consideration should be given to investment in efficient rail-road and rail-port interchanges and to identifying optimal locations for these interconnection points. This implies the need for rail planners to consult with public and private developers of inland container depots and other transfer facilities, as well as port developers, so that their plans and needs are included in plans for the development of the rail network.⁵

Information Exchange

A GMS rail database and information network should be established, based on a common statistical reporting framework agreed on by GMS railways and responsible ministries.

Operating statistics, train performance, commodity statistics, financial information, and other comparative information on GMS railways are very difficult to obtain or not readily available. Further, the raw data that are available normally require significant additional processing in order to derive performance and output indicators.

A GMS rail database and information network should be established, based on a common statistical reporting framework agreed on by GMS railways and responsible ministries. The key output of the network would be a set of annual statistics available to all stakeholders. To further enhance cooperation among GMS railways, the detailed source data should be accessible by all GMS railways and responsible ministries.

Such an exchange of data could lead to the future establishment of a GMS regional railway association, which could develop into an entity with responsibilities similar to those of the Association of American Railways.⁶

⁵ A recent development in Sweden may provide a useful model for network planning. Sweden plans to merge the planning, management, and regulation of its national rail and road networks into one entity.

⁶ The Association of American Railways represents the freight rail industry to the Government of the United States and facilitates the operations, safety, security, and research standards for this industry.

Private Sector Participation

The private sector should be involved in future planning and development of GMS railways.

The private sector is interested in investing in railways, particularly in

- operating rail freight and passenger services,
- leasing locomotives and rolling stock,
- maintaining track and infrastructure, and
- providing locomotive and rolling stock repair facilities.

However, the private sector will not invest significantly until the rail sector is reformed. Private investors want to

see transparent rules, regulations, and tendering procedures rooted in solid legislation.

Freight shippers and forwarders view the GMS railway network as part of a broader logistics chain. They are concerned primarily with finding the lowest-cost routing for their goods. There is interest in the private sector in developing inland container depots, in particular in the Lao PDR, Thailand, and Viet Nam.

The private sector should be involved in future planning and development of GMS railways. Clearly, it would be in the interests of both GMS railways and the private sector if the latter were to take part in future discussions on railway development to voice their concerns and expectations.



Economic Outlook and Trade in Greater Mekong Subregion Countries

Economic Growth

Over the past 30 years, the GMS has seen rapid economic change. Today, it is one of the fastest-growing (sub) regions in the world. The seven GMS economies grew 8.3% on average during 1992–2006. All the economies, except that of Thailand, expanded at an average annual rate of at least 6.5% (Table 1).

Trade Patterns and Trends

Thailand is the major trading country in the GMS, accounting for 71% of all trade in 2005, with Viet Nam increasing rapidly to its present share of 21%. The remaining 8% is shared fairly evenly between Cambodia,

Myanmar, and the Guangxi Zhuang Autonomous Region, with somewhat less for the Lao PDR, and a negligible proportion for Yunnan Province in the PRC.

Combined data on exports, imports, and trade openness (ratio of trade [exports + imports] to gross domestic product [GDP]) for the GMS economies in 1992–2005 are shown in Figure 2. The degree of openness to trade has grown faster in GMS countries (Table 1) than in most other Asian countries.

Conclusion

The favorable economic growth trends in the GMS—especially for Cambodia, the Lao PDR, and Viet Nam—

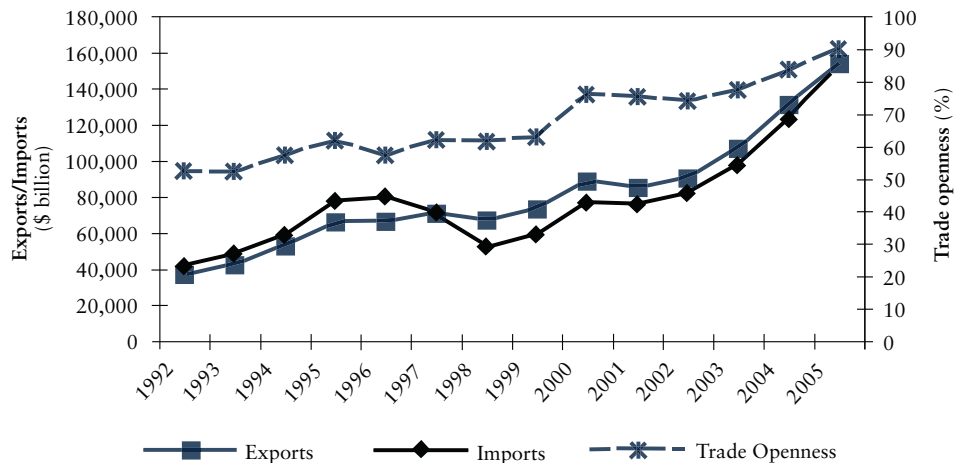
Table 1: Economic Indicators of the Greater Mekong Subregion Members

	Average Annual GDP Growth (%) 1992–2006	GDP (\$ million) 2006	Population (million) 2006	GDP per Capita (\$) 2006	Average Annual Growth in Trade Openness (%) 1990–2005
GMS Economy	8.4	7,264	14.2	512	11.6
Cambodia	8.4	7,264	14.2	512	11.6
Guangzi Zhuang AR	11.7	50,190	49.4	1,016	(...)
Yunnan Province	9.5	60,224	44.7	1,347	(...)
Lao PDR	6.5	3,433	5.7	602	7.8
Myanmar	9.6	13,002	56.2	231	(...)
Thailand	4.5	206,247	65.2	3,163	7.3
Viet Nam	7.7	60,883	84.2	723	8.3
GMS Economies	8.3	401,243	319.6	1,255	
PRC	10.3	2,626,304	1,311.0	2,003	8.9

(...) = not available, AR = Autonomous Region, GDP = gross domestic product, GMS = Greater Mekong Subregion, Lao PDR = Lao People’s Democratic Republic, PRC = People’s Republic of China.

Sources: Asian Development Bank, Statistical Database System; International Monetary Fund; National Bureau of Statistics of the People’s Republic of China.

Figure 2: Greater Mekong Subregion Exports, Imports, and Trade Openness, 1992–2005



Sources: Asian Development Bank, Statistical Database System Key Indicator Series; National Bureau of Statistics of the People’s Republic of China, China Statistical Yearbook; and International Monetary Fund, World Economic Outlook.

and increasing openness of trade among the countries indicate that prospects for increasing trade between them in the future are bright. Thus, there will be growing demand for transport of goods and increasing pressure on existing transport systems.

In the Lao PDR, proximity to high-growth economies also helps to offset some of the disadvantages of being landlocked. At the same time, Cambodia,

the Lao PDR, and Viet Nam benefit from an abundance of natural resources—such as minerals, oil, and gas—that provide a natural basis for developing railway transport.

Given all these factors, there will undoubtedly be increasing demand for an efficient GMS rail network to allow trade between the countries to prosper without experiencing delays due to transport bottlenecks.



Connecting Greater Mekong Subregion Railways: Evaluation of Possible Routes

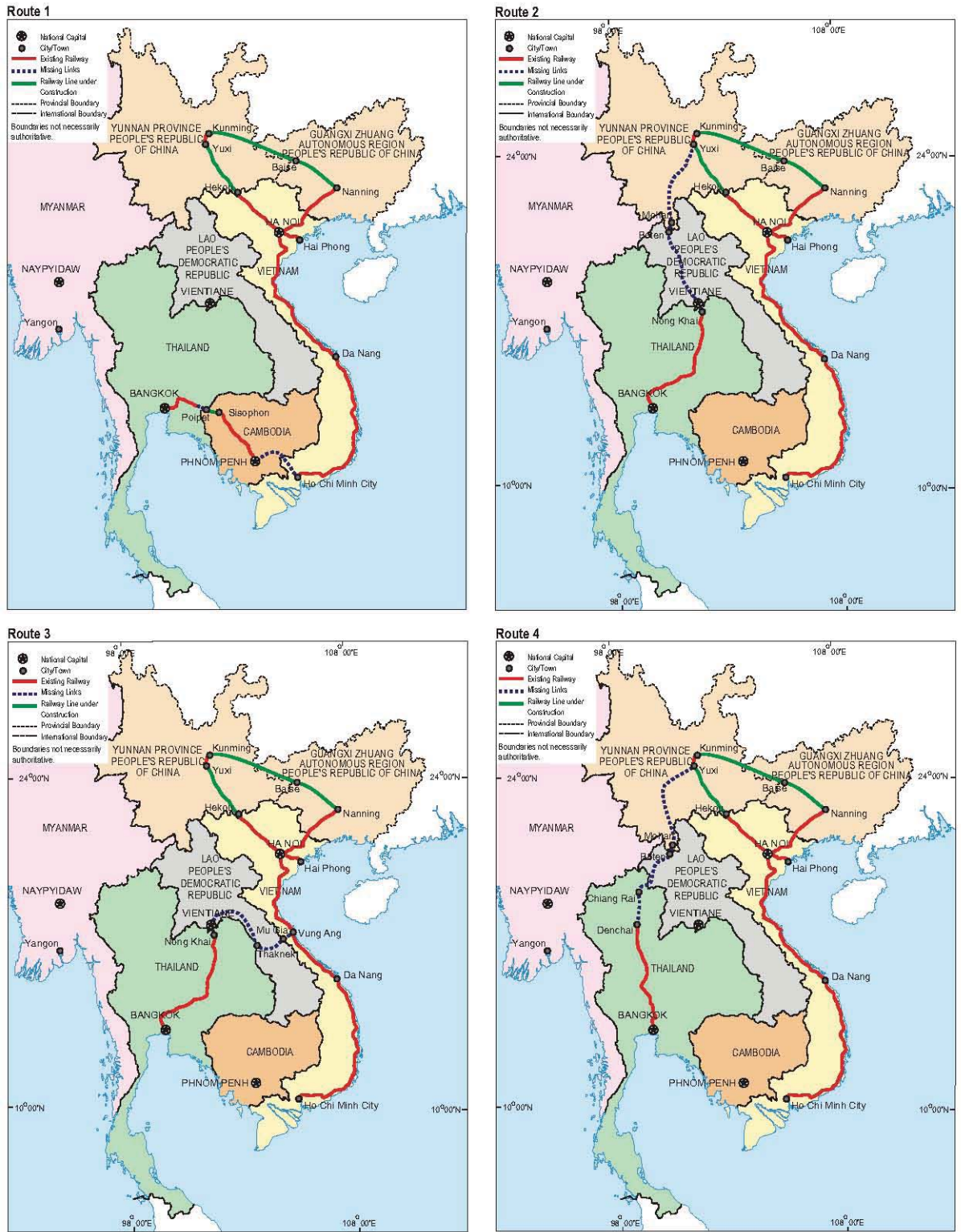
Major centers in the GMS are well connected by road, air, and inland waterways, but to date, only the PRC and Viet Nam are connected by rail. The following section addresses and evaluates four possible alternatives for linking the unconnected railways.

The four alternatives that were considered for connecting GMS countries by rail are

- Route 1: Bangkok–Phnom Penh–Ho Chi Minh City–Ha Noi–Kunming and Nanning
- Route 2: Bangkok–Vientiane–Kunming (via Boten–Mohan)–Nanning and Ha Noi–Ho Chi Minh City
- Route 3: Bangkok–Vientiane–Ha Noi and Ho Chi Minh City (via Thakhek–Mu Gia–Vung Ang)–Kunming and Nanning (via Ha Noi)
- Route 4: Bangkok–Kunming (via Chiang Rai–Boten–Mohan)–Nanning and Ha Noi–Ho Chi Minh City

Routes 1 and 3 were selected because they were defined in the Vientiane Action Plan 2004–2010 as priority routes in the Singapore–Kunming Rail Link (SKRL). Routes 2 and 4 were selected because they have often been identified as other potential SKRL routes. The routes are shown in Figure 3. There are, of course, other routes that could and should be considered, such as a route connecting the PRC and Thailand through

Figure 3: Four Potential Greater Mekong Subregion Railway Routes



Myanmar. However, planning is most advanced on the four routes considered here.

Rail traffic between the GMS countries was estimated based on a review of traffic in the last 5 years, assessing what proportion of the traffic could move by rail, and determining future traffic growth considering expected GDP growth in the countries. Projections to 2014 and 2025 for passenger and freight traffic by connecting route are shown in Table 2. The table also presents the estimated construction cost per route, based on available information from national plans and previous feasibility studies.

It must be emphasized that the cost of construction of missing links for the different routes does not take into account the upgrading over time that will be necessary—with or without the missing links—on the existing lines along these routes if they are to remain viable. These costs, including upgrading the lines and rolling stock, are estimated at about \$7 billion, whichever route is selected.

Table 3 summarizes the results of economic analysis of the four proposed routes and sensitivity testing. The sensitivity was tested for four variables—passenger traffic, freight

traffic, operating costs, and construction costs—and a decrease and an increase by 20% of each variable compared to the base case.

Note that investments in rolling stock and system upgrading elsewhere in the national systems are not included in Table 3 and would reduce the internal rates of return if taken into account.

The projections on freight and passenger demand and on internal rates of return (shown in Tables 2 and 3) suggest that priority should be given to constructing route 1. Relative to the other routes, route 1

- has the largest potential traffic volume,
- connects all GMS countries except Myanmar,
- has the lowest construction cost,
- has the highest projected economic internal rate of return,
- has attracted the interest of the private sector as investors and operators, and
- can be implemented quickly because a detailed feasibility study is currently under preparation.

Table 2: Estimated Greater Mekong Subregion Rail Passenger and Freight Demand Projections and Cost of Construction by Route

Route	Traffic Forecast				Cost Estimate (\$ billion)
	Passengers (million)		Freight (million tons)		
	2014	2025	2014	2025	
1	1.8	3.2	6.8	25.7	1.09
2	1.6	2.4	6.3	23.8	5.32
3	2.9	4.4	6.3	23.8	2.29
4*	3.7	6.3	6.3	23.8	6.28

* For Route 4, the cost of Chiang Rai–Chiang Khong–Boten link (330 kilometers) was not available; it was assumed that the cost per kilometer is the same as the other links.

Source: Consultant’s calculations.

Table 3: Estimated Economic Internal Rate of Return of Greater Mekong Subregion Railways (%)

Case	Level (%)	Route			
		1	2	3	4
Base Case	100	75	24	45	22
Sensitivity Analysis					
Passenger Traffic	80	75	24	44	22
	120	75	24	45	23
Freight Traffic	80	65	21	39	19
	120	84	27	50	25
Operating Costs	80	76	25	45	23
	120	74	24	44	22
Construction Costs	80	85	28	51	26
	120	68	22	40	20

Source: Consultant's calculations.



Strategic Framework

Goal and Priority Actions

The goal for the GMS countries in rail transport is an efficient and interconnected railway network. This section provides the strategic framework to develop such a network.

Toward that goal, five sets of priority actions are required:

1. Ensuring that all GMS countries are connected to a GMS rail network by 2020.
2. Promoting the development of a seamless rail network in the GMS by
 - agreeing on common technical standards of interoperability,
 - streamlining and harmonizing procedures for cross-border movement of people and goods,
 - agreeing on regional operating rules and safety standards,
 - fostering cooperation between GMS railways, and
 - ensuring connection to other modes of transport.
3. Ensuring that railway infrastructure and equipment in the GMS are modern and sufficient to meet the

demand for rail services, and operated and regulated according to best practices in the operation and regulation of railways.

4. Developing GMS railway organizations to support the network by establishing a GMS rail coordination office.
5. Involving the private sector in the planning and development of the GMS railway network.

The strategic framework has four components to support these priority actions: completing at least one connecting route before 2020, complementary investments in upgrading the national railway networks constituting the selected route, technical assistance projects to prepare national strategies and investment studies and to develop information networks, and establishing the GMS railway coordination office. These components are described below.

Component 1: Identify and Complete at Least One Connecting Route by 2020

The first component is sufficient investment to ensure that at least one GMS rail route is completed by 2020. The first step must be to identify the priority route to be built. This decision will act as a catalyst both for governments—

getting them to understand what is needed to make the decision and what is required to support the decision—and the private sector, to attract interest in the railway sector. The analysis herein recommends that the priority route be route 1. However, selection of a priority route for initial investments does not preclude construction of other routes.

Inherent in deciding on the route is the commitment to complete it. Without at least one complete GMS rail route, there will be no network. In that case, complementary efforts to expand the capacity of GMS railways (components 2 and 3) will not support the development of a network but individual national railway systems, which should, however, be undertaken concurrently.

Component 2: Complementary Investments

The second component is providing the supporting investments needed to upgrade the capacity of the existing railway lines on the selected route. Constructing missing links will be of little use if they connect to lines that have not been upgraded or are already experiencing capacity constraints.

Thus, once the priority route has been selected, studies on the upgrading requirements of the supporting lines should be completed or updated so that upgrading existing lines of the GMS priority route may proceed in parallel with constructing the missing links.

Component 3: Technical Assistance Projects

The third component is support for the many subsidiary but vital investments to address issues that are presently barriers to building an interconnected and efficient GMS rail network. They include adopting common technical standards; building appropriate regulatory regimes; fostering cooperation and agreements between countries on cross-border transport and exchange of information; and studies on developing national railway strategies and assessing the investments required in other aspects of railway operations, such as locomotives and rolling stock and human resources.

Some of the required investments might be attractive to the private sector. However, for others, the countries will require technical assistance. Appendix 1 contains an indicative long

list of possible technical assistance projects, indicating their potential benefits toward resolving these issues.

Component 4: Greater Mekong Subregion Rail Coordination Office

Developing an interconnected and efficient GMS rail network is a massive and complex undertaking, and it is important that it succeed. The rail development initiative needs to be well-coordinated, and, perhaps most importantly, will need to establish a profile in the GMS with all stakeholders. To achieve those aims, a GMS rail coordination office should be established in the subregion with a small staff—three specialists and perhaps a staff member from each of the GMS countries.

The functions of the coordination office would be to coordinate the work of various working groups and consultants; liaise with railway and government officials on issues related to railway network, and with the private sector to mobilize its participation; help with finance raising; monitor and report on GMS railway network progress; and serve as the focal point for developing the GMS railway information network and database.

Next Steps

This strategic framework provides a platform for further dialogue, discussion, and agreement on prioritizing and carrying out the actions necessary to bring the individual national railways together into a truly seamless subregional network. There are many identified constraints to implementing the identified priority actions. Key constraints are shown in Appendix 2, which also suggests ways to resolve them, primarily through parallel and sequenced technical assistance projects. (An indicative long list of possible technical assistance projects is in Appendix 1.)

The GMS Economic Cooperation Program is fortunate in having many opportunities, such as the GMS Subregional Transport Forum and Economic Corridor Forum, for discussion and decision making on priority actions and their implementation. Taking advantage of these opportunities should ensure that the desire of the GMS countries for an efficient GMS railway system will be fulfilled within the decade.

APPENDIX 1

Indicative Long List of Possible Technical Assistance Projects

No.	Project	Key Outputs	Benefits	Cost and Countries Involved (\$ million)
1	Facilitation of Agreement to Connect Railway Networks of Thailand and Cambodia	Bilateral agreement to connect.	Essential for development of GMS priority route (route 1).	0.125 All GMS countries
2	Determination of Investment Needs: Upgrading of Supporting Lines of GMS Rail Route 1	Investment plan for route 1 supporting lines.	Establishes investment required to support GMS priority rail route (route 1) and determines sources of financing.	0.250 All GMS countries
3	Ranking Study: Priorities for Investment in other GMS Rail Routes	Sequence of development of other GMS rail routes and component lines.	Sets priorities for next phase of investments in GMS routes. Can be derived (in part) from national railway strategies.	0.250 All GMS countries
4	Cambodia Railway Sector Development Strategy	Railway Sector Strategic Plan.	Determines national rail sector objectives and strategy.	0.125 Cambodia
5	Lao PDR Railway Sector Development Strategy	Railway Sector Strategic Plan.	Determines national rail sector objectives and strategy.	0.500 Lao PDR
6	Thailand Railway Sector Development Strategy	Railway Sector Strategic Plan.	Determines national rail sector objectives and strategy.	0.750 Thailand
7	Myanmar Railway Sector Development Strategy	Railway Sector Strategic Plan.	Determines national rail sector objectives and strategy. Embraces participation of Myanmar in development of GMS rail network.	0.500 Myanmar
8	GMS Railway Minimum Technical Standards	Regional working group to agree on common GMS railway technical standards.	Common technical standards are essential for network connectivity and interoperability.	0.500 All GMS countries
9	GMS Railway Rolling Stock Investment Needs	Long-term investment needs and strategy for funding.	Will aid in investment planning. Significant investment in new locomotives and rolling stock will be necessary, especially in fuel-efficient locomotives.	0.500 All GMS countries
10	GMS Railway Investment Needs: Telecommunications, Train Control, and MIS	Long-term investment needs and strategy for funding.	Will aid in investment planning. Significant investment in telecommunications, train control, and MIS will be required.	0.500 All GMS countries
11	Training Needs Assessment of GMS Railways	Long-term investment needs and strategy for funding.	Will identify GMS railways need for skills upgrading to embrace new technologies.	0.750 All GMS countries
12	Rolling Stock Leasing: GMS Market Potential Study	Identification of potential for development of private equipment-leasing companies to meet locomotive and rolling stock needs.	Requires participation of private sector.	0.250 All GMS countries (Private sector contribution 0.125)
13	GMS Railway Transshipment Exchange Facility Needs Assessment	Evaluation of efficiency of current transfer facilities and identification of options for improvements, and development of guidelines for investment by other GMS railways, if and when required.	Addresses rail gauge issue; meter gauge will remain for some time. Facilitates logistics chains and smooth functioning of network.	0.250 PRC and Viet Nam

continued on next page

Appendix 1: *continued*

No.	Project	Key Outputs	Benefits	Cost and Countries Involved (\$ million)
14	GMS Cross-Border Rail Technical Protocols	Regional working group to identify technical issues specific to rail and to develop agreed guidelines and protocols for handling cross-border inspections.	Facilitates logistics chains and smooth functioning of rail network.	0.500 All GMS countries
15	Implementation of Agreed GMS Cross-Border Protocols for Rail	Bilateral agreements for implementation of either agreed cross-border rail protocols or mutually modified protocols.	Facilitates logistics chains and smooth functioning of rail network.	0.600 All GMS countries
16	Development of Electronic Data Interchange in GMS Railways	Plan for electronic integration of GMS railways.	Involves private sector. Can aid in development of logistics chains, tracking by customers, online ticketing, etc. May solve some cross-border movement issues.	0.500 All GMS countries
17	Assessment of Multimodal Connectivity of GMS Railways	Evaluation of investments needed to ensure connection of GMS railways to other modes.	Essential for achieving an interconnected multimodal transport network.	0.500 All GMS countries
18	GMS Rail Database and Information Network	Regional working group to develop framework, define needs and reporting and sharing protocols, and to implement data network.	Will establish database of GMS rail statistics necessary for planning and evaluation. Fosters cooperation among GMS railways. Could be foundation for a GMS railway association.	1.000 All GMS countries
19	Assessment of Need for Restructuring of GMS Railways and Rail Sectors	Evaluation of the financial and operational performance of GMS railways; identification of options for changes in organization and sector to improve performance; development of consensus on strategy.	Sector restructuring in some form will likely be required to enable railways to generate capital to sustain (some) operations and meet future investment requirements. Reforms are needed to promote private sector investment. Involves extensive regional consultation with all stakeholders, public and private.	1.000 All GMS countries
20	Assessment of Safety in GMS Railways	Risk assessment of railway operational and workplace safety. Guidelines for safety management plans.	Action to eliminate unsafe practices and prevent incidents and accidents is important to general public.	0.750 All GMS countries
21	General Appraisal of Compliance with ADB Environmental and Social Safeguards in New Rail Construction Projects in GMS	Determination of degree of compliance with ADB safeguards. Recommendations for modification of ADB safeguards.	Difficult to finance investments without compliance with safeguards.	0.500 All GMS countries

ADB = Asian Development Bank, Lao PDR = Lao People's Democratic Republic, GMS = Greater Mekong Subregion, MIS = management information system, PRC = People's Republic of China.

APPENDIX 2

Priority Actions, Constraints, and Responses

Priority Action toward Completing the GMS Rail Network	Observed Key Constraint	Recommended Response*
Ensuring that all GMS countries are connected to a rail network by 2020	<ol style="list-style-type: none"> 1. Lack of consensus on where (and when) to start has delayed implementation of SKRL so far. 2. All GMS routes and secondary lines are considered important for national economic development of GMS countries; considerable investment (\$1.0 billion–\$1.5 billion minimum) will be needed to construct lines needed for the priority route alone; how to secure and structure financing for investment? 3. National railways and railway sectors in GMS countries are in various stages of development; strategy not yet set out in Cambodia, the Lao PDR, Myanmar, and Thailand. 	<p>Identify and complete at least one connecting route by 2020 (strategic framework component 1).</p> <p>Technical assistance to support necessary agreements, studies, and assessments (TA projects 1, 19, 21).</p> <p>Technical assistance to support development of national rail sector strategies, where lacking (TA projects 4–7).</p>
<p>Promoting development of a seamless rail network by</p> <ul style="list-style-type: none"> • agreeing on technical standards of interoperability • streamlining and harmonizing procedures for cross-border movement of people and goods 	<ol style="list-style-type: none"> 1. Technical standards and operating rules vary from country to country. 2. Decisions needed on use of standard- versus meter-gauge rail. 3. Cross-border rail protocols in place between the PRC and Viet Nam and between Thailand and Malaysia only; rail procedures different from those on road. 4. Extensive encroachment and trespassing on railway rights of way inhibit safe operations; greater potential for accident/incidents due to increased traffic (and increased speeds). 5. Connections to road and waterways need to be developed to ensure seamless network. 6. Shippers and passengers not participants in the development process. 	<p>Technical assistance on technical standards, rail gauge issues, cross-border protocols, data interchange, multimodal connectivity, database development, and safety assessments (TA projects 8, 13–18, 20).</p>

continued on next page

Appendix 2: *continued*

Priority Action toward Completing the GMS Rail Network	Observed Key Constraint	Recommended Response*
Ensuring that railway infrastructure and equipment are modern and sufficient to meet the demand for rail services	<ol style="list-style-type: none"> 1. Investment needed for locomotives, rolling stock, telecommunications, information technology, and human resources is substantial and not yet clearly identified. 2. National railways (and railway sectors) in GMS countries are in various stages of development. 3. Financing is limited. 	<p>Provision of supporting investments (strategic framework component 2). Technical assistance to assess needs in rolling stock (buy/lease), telecommunications, train control, management information systems, and restructuring needs assessment (TA projects 8–13, 19).</p>
Supporting the development of GMS railway organizations and the implementation of best practice in the operation and regulation of GMS railways	<ol style="list-style-type: none"> 1. National railways and railway sectors in GMS countries are in various stages of development; agreed strategy not set out in Cambodia, the Lao PDR, Myanmar, and Thailand. 2. GMS railways not viable from a purely economic and financial perspective; but there is a need to balance national economic and social development objectives with long-term need for efficient rail operations. 3. Staff in most GMS railways need skills development and exposure to modern railway technologies. 	<p>Technical assistance on national railway strategies, training needs assessment, and electronic data interchange (TA projects 4–7, 11, 16, 18–20); establish a GMS rail coordination office (strategic framework component 4).</p>
Involving the private sector in the planning and development of the GMS railway network	<ol style="list-style-type: none"> 1. Regulatory and legislative environment is not conducive. 2. Railway organizations are not commercially responsive. 3. Private sector is currently not participating. 4. Environmental and social safeguards must be followed to ensure ADB investment in capital projects and to attract private lending institutions. 	<p>Technical assistance projects to study rolling stock leasing, transshipment exchange facility, data interchange, multimodal connectivity, restructuring, and compliance with safeguards (TA projects 12, 13, 16, 17, 19, 21).</p>

ADB = Asian Development Bank, GMS = Greater Mekong Subregion, IT = information technology, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, SKRL = Singapore–Kunming Rail Link, TA = technical assistance.

* Technical assistance projects are described in Appendix 1.



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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org
ISBN 978-92-9092-053-3
Publication Stock No. RPT102079



Printed in the Philippines