CROSS-BORDER INFRASTRUCTURE TOOL KIT
Asian Development Bank
A tool kit in cross-border infrastructure in the Greater Mekong Subregion


This tool kit was prepared by staff and consultants of the Asian Development Bank (ADB) based on the discussions from the Learning Program on Cross-Border Infrastructure in a Market Economy (held in Phnom Penh, Cambodia).

The views expressed in this tool kit are those of the authors and do not necessarily reflect the views and policies of ADB or its Board of Governors or the governments they represent.

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Use of the term “country” does not imply any judgment by the authors or ADB as to the legal or other status of any territorial entity.

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The teaching faculty was comprised of Rita Nangia (Lead Faculty and Director, Special Projects - Southeast Asia Regional Department, ADB), Sidharth Sinha (Professor of Finance and Accounting, Indian Institute of Management, Ahmedabad), Max Bradford (Director, Castalia Strategic Advisors and former Senior Cabinet Minister and Member of Parliament of New Zealand), and Yong Hee Kong (Cofounder, PPP Resource and Research Centre, Kuala Lumpur). The program was organized by Pamela Asis and Jordana Queddeng of the Phnom Penh Plan Secretariat under the supervision of Sukhdeep Brar, Senior Education Specialist, Southeast Asia Regional Department, ADB; and in partnership with the Economics and Finance Institute of Cambodia. Rajat Nag, former Director General of the Southeast Asia Regional Department, and Arjun Thapan, Chair of the Phnom Penh Plan Steering Committee and Director General of the Southeast Asia Regional Department of ADB, provided management support and guidance for this project.

Rita Nangia and Evangeline Sucgang prepared this tool kit based on the course material, with administrative support from Ma. Carmen Alcantara.
How to use the tool kit

To navigate through this resource material, open the Tool Kit Map file in the accompanying CD-ROM. Explore each section in the map, as well as the subsections, by double-clicking the items, which are either highlighted or where the pointing finger appears. To exit, close the pdf document(s).

The tool kit has four main sections:

The **Booklet** contains the electronic copy of the accompanying pamphlet as well as links to features and special topics such as the Greater Mekong Subregion Program.

The **Grid of Topics** contains links to PowerPoint presentations and handouts of four focus areas, namely: Planning, Finance, Regulation and Accountability, and Private Sector Participation.

The **Resources and Links** contains a list of suggested reading materials that can be read on-screen or printed as well as links to relevant websites.

The **Glossary** contains a list of related and useful terms.
Cross-Border Infrastructure: A Tool Kit

The complexity of regional infrastructure demands that public sector managers and planners develop holistic and multidisciplinary perspectives. Cross-border infrastructure is defined as any cooperation initiative between two or more countries to strengthen physical connectivity. Typically, cross-border projects need to create value beyond what two national infrastructure projects would bring through integration of markets and connecting communities. This tool kit has been prepared based on a learning program offered to middle and senior policy makers of the Greater Mekong Subregion (GMS) under the Phnom Penh Plan in March 2006. The program had four focus areas, namely, policy and planning, finance, private sector partnerships, and regulation and accountability. Each area was covered by an expert and included four learning modules.

This Cross-Border Infrastructure Tool Kit has been organized to follow a grid of topics covering these four focus areas. PowerPoint presentations, handouts, and suggested reading materials for each topic are available in the accompanying CD-ROM, including case studies to enhance the user’s understanding of the concepts. This booklet gives an informative overview of cross-border infrastructure in general while the highlighted portions in the text indicate that a more detailed description of that section is available in the CD-ROM.

It is recommended that users go over this booklet first to benefit the most out of the tool kit.

Preparation of this Cross-Border Infrastructure Tool Kit has been made possible with funding support from the Public-Private Infrastructure Advisory Facility. The teaching faculty for the program included: Rita Nangia - Lead Faculty and Director, Special Projects at the Asian Development Bank; Max Bradford - Director, Castalia Strategic Advisors and former Senior Cabinet Minister and Member of Parliament of New Zealand; Sidharth Sinha - Professor of Finance and Accounting, Indian Institute of Management Ahmedabad; and Yong Hee Kong - Co-founder, PPP Resource and Research Centre, Kuala Lumpur. Training and support staff for Phnom Penh Plan includes Pamela Asis and Jordana Queddeng. Rita Nangia and Evangeline Suugang prepared this tool kit.
Module 1: Policy and planning framework

Policy and planning framework for cross-border infrastructure is one of the most complex topics. In addition to the usual difficult issues encountered in infrastructure planning, in the case of cross-border infrastructure, there is no single or unique way of dealing with issues because planners are often faced with multiple constituencies, numerous and often-conflicting objectives, lack of overarching legal framework, and lack of single decision-making body. Cross-border infrastructure planning needs significant resources and institutional mechanisms to establish mutually acceptable processes among various groups of stakeholders. It has to be recognized that successful regional outcomes need regional ownership.

Module 1 Topics

This module covers topics and examples of basic planning tools applied to cross-border infrastructure. Drawing from case studies, it provides greater understanding of challenges involved in cross-border infrastructure.

Module 2: Finance

This module is designed for policy planners who have limited background in finance. It covers basic terminologies used in finance, different modes of financing cross-border infrastructure, financial analysis basics, case studies, and some special topics covering recent financial tools. It uses the case study method and provides background reading materials to supplement presentations.

Module 2 Topics

Financing for cross-border infrastructure involves multiple sources and is influenced by the cash flow requirements and risk profile. This module also explains how regulatory decisions affect the cost of capital, largely through investors’ perception of risks. Various theoretical terms and concepts are explained with the help of transport and energy projects.

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Finally, the module covers how global, regional, and national financing needs are met and what financial instruments are available to structure mega projects.
Module 3: Regulation and accountability

This module is designed to provide policy planners a perspective on the different models of regulation and accountability for the infrastructure sector in general and cross-border infrastructure in particular. Over the last few years, a large number of regulatory institutions have been set up in developing countries. However, there is also widespread dissatisfaction with the quality of these institutions and their impact on improving governance and accountability structures for the infrastructure sectors. This module is designed to inform policy makers about the basic concept of regulation, and outlines the reasons for its being an essential component of infrastructure provision.

The session also provides an overview of risk and risk management, tariff and rate regulation, and the basics of competition and universal service provisions for utilities. Finally, it focuses on the more complex issues of governance in cross-border infrastructure, including barriers to its successful implementation, and integrating accountability mechanisms in the development and maintenance of cross-border infrastructure.

Module 4: Private sector participation

This module is designed to provide policy planners a perspective on the private sector partnership (PSP) in infrastructure. It provides background information on why private sector participation in infrastructure is being promoted. The module covers sessions on what particular characteristics of cross-border infrastructure make it attractive to private sector participation as well as the costs and benefits of private provisions compared to state-owned or -managed enterprises.

The module is designed to compare and contrast different models of PSPs. While doing this, it draws on experiences outside Asia of successes and failures in PSP in infrastructure provision. One of the sessions is devoted to renegotiation experiences to identify important lessons based on a case study comparing mass transit in Bangkok and Kuala Lumpur.

Finally, it draws on the constraints and barriers to promoting cross-border PSP and identifies actions needed to make this mode successful.
Cross-border infrastructure in history

Cross-border infrastructure links nations and shapes the regional integration process. Of several examples of cross-border infrastructure during ancient times, the Silk Route is perhaps the most well-known case of ancient cross-border infrastructure although other important trade and transit routes predate it. In some sense, in premodern times, the world market was nothing more than a series of interconnected regional markets facilitated by infrastructure. Before the Europeans arrived in Asia, intra-Asian trade was robust at the core of a broader global trade—with Japan, Ancient China, India, and Southeast Asia as major players. Crafts and Venables argue that in 1750 more than 50% of the world’s industrial output was produced in China and India.¹

Connecting Asia and Europe through the Middle East, the Silk Route stretched over 6,000 kilometers. Although this was not a single road, several alternative trails connected these areas through very difficult terrains and climate zones. Trade along this route was through goods transported by several local caravans in forms of chains and passed through many traders before eventually reaching their final destination far away. Alongside of these caravans, monks and pilgrims also traveled spreading knowledge, culture, and religion. The Silk Route also created prosperous clusters of towns and trading posts, complete with software aspects such as exchange, distribution, and storage of goods. A major channel for trade and transfer of technology, the Silk Route included knowledge sharing regarding administrative practices—such as promulgating standard weights and measures, and a system of numerical notation and marking; and identifying commercial goods by seals—and opening far-flung areas to trade and commerce. Some historians compare the Silk Route to the modern day communications highways.

In more recent history, Weber² suggests that the “transport revolution played a major part not only in the economic but political history of Europe.” Europe saw a major expansion of its cross-border infrastructure network in terms of railway networks, telegraph lines, electricity and cables, gas and water works in the 19th century, followed at the turn of the century by telephone lines and tramways. Most of these were seen as technological innovations in terms of new services.

Throughout time, cross-border connectivity has played an important role in the expanding global economy. Though historiographies recognize the importance of such infrastructure linkages, only recently has research focused on the analytics of such linkages. The fact still remains that different phases of globalization of the world economy are tied to a different phase of infrastructure development connecting regions beyond national boundaries.
What is cross-border infrastructure?

Cross-border infrastructure is defined as any cooperation initiative between two or more countries to strengthen physical connectivity. Typically, cross-border projects need to bring additional benefits that are not achievable through two different sets of national infrastructure projects.

The software component should be recognized as inseparable from the hardware component if the actual physical connectivity were to be improved. Software aspects referred here include legal and supporting policy framework, and human and institutional capacity, whereas hardware refers to infrastructure components that facilitate physical connectivity.

Physical transport network connecting two countries is considered hardware whereas customs facilitation and harmonization of trade and transit rules are the software aspects of any cross-border transport infrastructure. For the power sector, transmission lines and power plants would be hardware whereas power trading agreements (grid code, settlement code, security, planning and maintenance, etc.) and harmonization of rules and regulatory framework would fall under software aspects.

Projects such as Suez Canal, Channel Tunnel, Gas pipelines across Europe and USA-Canada, Nam Theun 2 Power, or the Oresund Bridge joining Denmark and Sweden are just a few high-profile examples of cross-border infrastructure. Many more, smaller essential infrastructure links connect two or more countries.

Asia’s integration has been largely market driven

Developing Asia’s economic performance in the last few decades has been impressive. As a group, the region has grown at an average rate of 7% since 1980. It has achieved rapid poverty reduction: 300 million fewer people lived in poverty in 2003 compared with 1990.3

A large number of initiatives have been taken to integrate Asia: some of these are broad development forums, whereas others focus on enhancing connectivity through infrastructure or removal of trade barriers through free trade agreements. Though the list of Asian regional initiatives is large and impressive, most of the Asian integration has been market driven. Strong export growth and high foreign direct investments have been two important drivers of most Asian economies. East Asian integration has largely been private
sector driven, created by strong market forces of trade and investment. Such integration was in the form of regional production networks and supply chains, without much direct institutional support from regional governments.

This market-driven integration has led to new demands on the distribution structures requiring complex logistics services. There is enormous potential for improving regional cross-border infrastructure to support regional production and trade activities. This is particularly important for the GMS economies because reinforcing the region’s comparative advantage is possible as these economies are still at different stages of development. Regional connectivity through cross-border infrastructure will be crucial in such a case because it supports complementarities in production across the entire region, looking beyond national boundaries.

What is so special about cross-border infrastructure?

Several attributes of infrastructure make it different from other goods, in addition to inherent complexities in dealing with many sovereign countries:

- Infrastructure is a capital good, which produces a service in combination with other inputs.
- The services provided are relatively capital intensive in this form of capital and tend to exhibit important economies of scale.
- Infrastructure is generally lumpy rather than incremental.
- It is long lasting, which has important implications for financing and maintenance.
- The location of services provided is space and use specific.
- A high proportion of the costs involved in infrastructure are sunk costs.
- Infrastructure is a source of direct services for final consumption and an input into productive processes.

In addition to these common attributes, cross-border infrastructure:

- Is very political; often used as a foreign policy tool by countries,
- Needs a framework for sharing costs and benefits on a fair basis between countries,
- Has high transaction costs, and
- Encounters difficulties in structuring project finance.

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### Intraregional Trade Shares (%)*

<table>
<thead>
<tr>
<th>Regions</th>
<th>1980</th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia +</td>
<td>34.6</td>
<td>52.2</td>
<td>55.2</td>
</tr>
<tr>
<td>Japan</td>
<td>22.1</td>
<td>40.7</td>
<td>44.2</td>
</tr>
<tr>
<td>NIEs</td>
<td>6.4</td>
<td>15.5</td>
<td>14.4</td>
</tr>
<tr>
<td>ASEAN</td>
<td>18</td>
<td>24.7</td>
<td>23.9</td>
</tr>
<tr>
<td>NAFTA</td>
<td>33.8</td>
<td>48.8</td>
<td>46.4</td>
</tr>
<tr>
<td>European Union-15</td>
<td>60.7</td>
<td>62.3</td>
<td>62.1</td>
</tr>
</tbody>
</table>

*Intraregional trade as share of total trade

ASEAN = Association of Southeast Asian Nations; NIEs = newly industrialized economies; NAFTA = North American Free Trade Association
These attributes make cross-border infrastructure more vulnerable to both market failures and government failures. It is very important to examine the distribution of costs and benefits between different countries and stakeholder groups. Economic analysis is an important tool to assess the overall costs and benefits, and their distribution between different countries and groups of stakeholders.

Choosing good projects

The economic analysis of projects is similar to financial analysis of projects as both assess the profitability of investments. Financial analysis is about the profits of the financial entity, whereas economic analysis examines the welfare gains for the national economy, comprising its citizens.

Many different concepts of economic costs and benefits are being used in economic analysis. The economic analysis of any project involves defining project objectives and identifying the underlying rationale for use of public funds. Forecasting effective demand and choosing least cost design and a discount rate are all important steps to assess whether the project’s net benefits will be sustainable over the life of the project. Adequate risk analysis also needs to cover the social and environmental risks of the projects.

In addition, for any cross-border infrastructure project, economic analysis needs to be extended, adopting multi-country framework, to analyze the impacts over the region. Distribution of costs and benefits will influence the overall success of such projects.

This tool kit presents a hands-on exercise covering economic analysis, including distributional aspects of cross-border infrastructure which is explained with the help of an example from the North–South Economic Corridor project, connecting Chiang Rai to Kunming via landlocked Lao People’s Democratic Republic (Lao PDR).

Almost all large infrastructure has externalities: some positive and some negative. Safeguards policies ensure that negative externalities are minimized to the extent possible and that affected people are compensated adequately.

The Northern Economic Corridor Project demonstrated that cross-border projects often have to deal with uneven distribution of environmental and social costs: The project would benefit the People’s Republic of China (PRC) and Thailand exporters and importers due to
significant savings in logistics costs whereas Lao PDR would have to deal with the negative externalities in terms of displacement of people, risk of damage to protected areas, and spread of HIV/AIDS including increased trafficking in peoples. The project design had to evolve a framework that would deal with these risks, including building institutional capacity to monitor negative impacts.

Project finance

Infrastructure projects are capital intensive and many financing options are available. Investments can be financed through equity or debt. Traditionally, governments used public finance for infrastructure: through equity or debt, by borrowing funds from the market, or using its own funds generated from tax or other revenue. Governments either financed these projects directly or through public corporations. Often it also used mechanisms such as guarantees.

Infrastructure is increasingly structured and financed using project finance, based on the project’s assets being paid through a future stream of revenue. Usually the project is created as a special purpose, legally independent company which has equity enough to get the necessary debt to fund the assets required at reasonable cost. Such project company may have sponsors who limit their liabilities by adopting structured project finance rather than take the risks on the corporate balance sheet. Unlike corporate finance, the sponsor or developer of the project’s risk is limited only to the sponsor’s equity contribution. Project finance mode by design does not build up equity, but instead uses cash quickly first for operating expenses, than as debt service, and finally as dividends. Usually these structures are coterminous with the length of off-take agreements.

In project finance, lenders provide the bulk of finance and take most of the risk. There are several types of risks in cross-border infrastructure projects, which need to be assessed.

Risks

The level of risk is the most important determinant of the cost of capital since private investors expect a return that is commensurate with the risks involved. Cross-border infrastructure projects, at times, face larger overall risks than national infrastructure.
Any project faces two types of overall risks: project level risks and country risks. Regional or country specific risks include political risks, country-related economic risks (i.e., policy environment, government regulations, currency risks) and legal risks. These risks such as changes in the policy environment, legal or regulatory framework, or political risks continue to be present throughout the life of the project. Project specific risks include pre-construction development risks (in terms of time and costs, including possible costs of failures), construction risks, operations risks, commercial risks, and force majeure risks.

One of the most important risks in cross-border infrastructure is project development risk: due to lack of single jurisdiction, such projects have much higher demands for coordination and approvals. The country level risks usual in such projects get more complicated due to multiple constituencies and involvement of more than one government, one system of legal and regulatory framework. Projects take much longer to reach actual financial closure with often high transaction costs.

The project risks can be evaluated from the point of view of the sponsors, lenders, or governments. Usually lenders evaluate these risks critically because they have the largest stake in the project success. The various risks are evaluated in terms of its impact on cash flow for the project.

**Financial analysis**

The most important decision tool in financing a project is its financial model. A financial model assesses the interdependence of revenue, capital expenditure, operations, structure of financing, and other inputs. The financial analysis of a project is carried out to assess the viability of any investment, and two important performance measures are *internal rate of return* or *net present value* and debt-service coverage ratios. Financial analysis uses the discounted cash flow methodology based on the notion of *time value of money*.

The tool kit uses the case study of the **Nam Theun 2** project to explain the underlying terms and provide a basic understanding of financial analysis.
Raising resources

Raising the required resources for infrastructure development in developing countries has always been a major challenge facing policy planners. Debt finance dominates most infrastructure projects and hence it is important to understand important aspects of debt financing such as debt maturity, put and call options, fixed or floating interest rates, interest or currency swaps, or credit rating. Well-developed financial markets are the important key to raising resources for cross-border infrastructure. In Asia, however, the banking sector continues to dominate the market.

Other than debt markets, options such as guarantees, credit enhancement mechanisms, or user charge-based specialized funds also help in raising resources for infrastructure projects.

Regional sector planning challenges

Political boundaries of nations often impede regional trade and integration: even in the most open economies, domestic trade is much larger than the international trade. And though in the last few decades the globalization process has weakened the political barriers to trade expansion and production integration, significant logistics barriers still remain in place, affecting the overall geography of trade.

Cross-border infrastructure creates an opportunity beyond political boundaries for trade expansion and integration for any region. Since most of the infrastructure sectors are network industries, a system-wide approach may be necessary to maximize benefits from such integration. A number of planning models that minimize overall costs for any given objective are available.

In the GMS program, three ongoing studies aim to prepare strategies for transport, energy, and power. The transport strategy aims to develop a multimodal, GMS-wide transport model that identifies a priority investment program and will also help evaluate individual projects for their network impacts. In power trading, work needs to address not only the physical linkages to integrate power systems, but also regulatory frameworks and procedures for efficiency improvements. Meanwhile, work is ongoing for an energy strategy that aims to identify alternatives to meet the increasing demand for energy in a sustainable way.
Regional sector planning needs to not only apply existing tools for sector planning, but will also need an institutional framework for consultations. In the GMS is a broad hierarchy of institutional arrangements to prepare regional strategies. Working groups for energy and transport exist at ministerial levels, supported by a number of other institutional arrangements for coordinating work at the technical level.

It is important to recognize that regional sector planning involves high transaction costs and is time consuming.

Why private sector participation?

Private sector participation in infrastructure is not new. Railroads in the USA, Suez Canal, and transnational infrastructure across European countries all had private sector participation using different models. There are many methods of privatization and forms of public–private sector partnership (PPP), and each has its own advantages and disadvantages.

When selecting the form of PPP to undertake, local conditions must be taken into account. There is a lot of PPP experience in national and cross-border infrastructure. It highlights the differences in the development of PPP brought about by specific country conditions, and shows that PPP in Europe today covers activities beyond the traditional toll roads and infrastructure development.

Europe has a long history of successes (and failures) in PPP and a number of lessons can be learned from them. Some PPP projects failed because of contracts that were not balanced and risks that were not fairly shared between the private and public sectors. Many European countries have set up special PPP units to coordinate and focus their efforts in PPP. These units are important to the successes of the countries’ PPP development. A national PPP law is key to the success of PPP development in a country, in that it provides a framework for transparency.

Renegotiation, which can be a painful experience for both the private and public sectors, is resorted to when the performance of PPP projects do not measure up to expectations. Using a case study, the session in Private Sector Participation highlights the problems leading to renegotiation and its final outcome. It also makes the case that in renegotiation, all stakeholders must participate in burden sharing to create a win-win scenario.

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What else is needed for cross-border infrastructure?

While PSP in infrastructure sectors are considered important in an individual country and several cross-border projects involve PSP (such as Nam Theun 2), there is no formal framework for private sector partnerships for cross-border infrastructure. The current practice of approval on a case-by-case basis increases transaction costs for individual projects with long time lags and high failure rates.

For successful PSPs for cross-border infrastructure, the following are considered prerequisites:

Not only the legal and regulatory frameworks for private participation in infrastructure sectors for both countries have to be harmonized, but active support for cross-border private partnerships should also be actively encouraged.

Second, barriers such as financial and administrative differences over tax regimes, insurance requirements, value added tax or VAT, currency, and other barriers need to be addressed so that PSPs can materialize. Not only some of these rules and regulations need to be clarified up front, but even the processes need to be synchronized. For example, if two countries have very different regimes for the approval of a PSP, or the process of safety and environmental clearances are very different, private interests in such cross-border projects would be limited.

Finally, successful cross-border PSPs require collaboration at different levels: at the government institutional level, industry level, and between public and private partners. At times, formal institutional processes help reduce risks inherent in such cross-border projects.

Why do we need regulation?

Regulation relates to a set of policies and government activities that determine behavior of market participants in any sector. Regulation involves setting up a legal framework defining rules or standards of behavior in market, and institutions that will monitor and enforce these rules. Since infrastructure often involves monopolistic structures due to market failures, information asymmetry, large negative and positive externalities, the need for regulation and effective accountability for performance is essential. Economic regulation is needed to address the problem of natural monopoly. In a competitive market, customers can choose between suppliers, so suppliers try to offer the products and services customers want. Competition between suppliers keeps
the prices in line with costs. But effective competition does not always exist. Economic regulation can be usefully thought of as mimicking the pressures that competition provides in other markets; that is, it should require providers to offer services their customers want, and to charge reasonable prices. Reasonable prices, in this sense, are prices which are enough to cover the efficient cost of providing the service, including allowing a reasonable return on capital employed.

In fact, setting up regulatory institutions with effective accountability structures is one of the most difficult parts of successfully developing infrastructure in any country. Overall infrastructure provision and service quality outcomes depend very much on the design of appropriate public policies and effective implementation of these policies. An effective system of regulation ensures that consumers are protected from the abuse of market power or political and economic opportunism, that there is predictability and stability for investors, and that the right types of incentives operate existing and new assets efficiently.

When it comes to cross-border infrastructure, the problems are multiplied manifold largely due to the lack of a single overarching accountability framework.

**What are the different forms of regulation?**

At the outset, understanding the differences between economic and noneconomic regulations is important. Economic regulation is defined as the rules and institutions that set, monitor, enforce, and change the allowed capacity, tariffs, and service standards for infrastructure service providers such as water or electricity companies (Castalia 2005b). Economic regulation is distinct from other forms of regulation which include environmental regulation, safety, consumer protection, or regulation emerging from social objectives. The boundary between economic regulation and other forms of regulation can be blurred, for example, life-line tariffs for some utilities emanate from social objectives, but has an important impact on economic regulation.

In general, economic regulation helps improve sector performance compared to a case where there is no regulation. Several regulatory options are available for particular types of infrastructure:

The purpose of economic regulation of natural monopolies is to replicate efficiency outcomes of competitive markets (De León 2001; Castalia 2005b) and thereby prevent monopoly abuse. Many
instruments are available for this purpose. The first and the best approach is to create market structures that are competitive. This may be possible for some infrastructure services. Where this is not feasible, there are opportunities to create market for infrastructure services.

**Incentive Regulation:** This is a “form of regulation that provides the regulated firm with the types of earning incentives found in a competitive market and allows the firm, to some degree, to respond to those incentives” (Hemphill et. al. 2003).

Price and quality regulations are key regulatory activities for infrastructure services.

**Self-Regulation:** In a number of countries, the option of self regulation is also possible. For example, in Germany, electric power companies are granted the right to self-regulate general rules of network access.

**Why is cross-border infrastructure regulation different?**

Regulation can be at different levels of governments: it is common to see regulation at the local government, regional, and at national levels. The European Union has a host of regulations that impacts infrastructure performance, both within an economy and across countries. Cross-border infrastructure requires harmonization of policies, rules, and regulatory practices; otherwise, the transaction costs of dealing with differing regulatory practices become a major barrier to investments. There can be significant political nervousness at the real or perceived loss of sovereignty in allowing cross-border infrastructure development, in part because between-country agreements reached will involve a compromise, perhaps combined with a move toward more independent regulation mechanisms to ensure that the sectors develop in a coordinated way. However, there are available strategies to ensure that the transition path minimizes these fears, and ensures that the respective countries sanction any changes. In GMS countries, the cross-border trade and transit policy is one successful example of harmonization of rules and regulations that govern the movements of people and goods. Others are long established, such as the International Telecommunications Union which sets (regulates by agreement) telecommunications standards between countries. This has allowed the seamless development of telecommunications systems on a worldwide basis.

The largest and most comprehensive of the customs union systems to integrate economic development is the European Union. Others include the Common Economic Relationship between Australia and
New Zealand which is one of the “deepest” economic relationships in the world; the NAFTA (North American Free Trade Association) relationship between the US and Canada, and the burgeoning free trade agreements at a bilateral level. The World Trade Organization is an example of a (relatively) narrowly focused cross-border policy harmonization process in trade.

**Regulation for cross-border infrastructure**

The first requirement is to ensure that the regulatory system in each country is well defined, and share common characteristics. Inevitably, the regulatory regimes have to be harmonized in such a way that the integrated infrastructure businesses (e.g. in electricity or rail transport) share common service standards at the physical level. In the case of telecommunications or air traffic control, the standards will have already been established by sector-specific international bodies such as the International Telecommunications Union.

These organizations do not exist—as yet—for sectors such as electricity or transport. For example, interconnection standards and voltage quality control will need to be negotiated prior to the design of cross-border power trade. Though this can be done individually for a few projects, if there is a large number of projects, there is a need for a regulatory framework to deal with power trade issues. Overall need for harmonization of policies and rules and regulations varies depending on the complexity of the sector involved. For sectors such as power, elaborate arrangements are needed, whereas for roads, these are relatively simple.

**Urban infrastructure**

Cross-border infrastructure planning shares some similarities with urban planning and there is rich experience from urban planning over last few decades, especially in the US, that can be successfully used for planning successful outcomes for cross-border infrastructure. One of the basic complexities arises from multiple jurisdictional levels. Cross-border infrastructure planning involves planning for infrastructure assets creation across different political systems, different planning and policy regimes, different legal structures, and very different procedures. Domestic political interests often guide local actions, which may or may not be conducive to regional plans. There is also an additional problem of asymmetric distribution of costs and benefits between different countries and different groups of stakeholders.
Checklist of issues

The major barriers to effective cross-border infrastructure planning that policy makers need to address include:

**Political factors**

- Infrastructure is very political and cross-border infrastructure even more so because it invariably raises geopolitical issues. More often than not, a cross-border infrastructure project, policy, or program is used to promote or hinder the foreign policy goals of governments.
- Multiple constituencies are involved in cross-border infrastructure and institutional mechanisms are needed to sort out the true objectives of cooperation efforts. Developing trust between countries takes time.
- Strong country leadership and ownership are crucial for cross-border infrastructure to move from the drawing board to implementation. Several levels of governments are involved in planning and coordinating cross-border infrastructure. Often, even within a country, differences in perceptions exist between the central planner and the local governments and users about the importance of cross-border infrastructure. This leads to problems of mismatch in prioritizing and allocating resources. For example, local level governments have greater stakes in connectivity with neighboring regions compared to the central government.

**Economic and financial factors**

- Better connectivity through cross-border infrastructure and its linkages with logistic cost reduction, trade expansion, economic growth, and poverty reduction are indirect and long term. This often raises doubts over present resource allocation, especially for high profile projects.
- Cross-border infrastructure is highly capital intensive and, once built, lasts long. These factors have important impacts on financing and inherent risk profiles of such projects.
- As was seen in all cases presented above, groups of stakeholders that bear costs are not necessarily those that benefit from the project. Such asymmetric distribution of costs and benefits between different groups of stakeholders need to be addressed with appropriate institutional arrangements that are sustainable.
• When costs and benefits between different groups vary dramatically, the issue of incentives compatibility needs to be addressed and internalized at the planning and design stage. For example in Nam Theun 2, compensation for environment and social impacts needed to be built into the design of the project and had to be part of the contracting arrangements.

• Interests of pure transit countries differ as compared to those countries benefiting from such a link. For example, it was found that in the Northern Economic Corridor, the benefits would largely accrue to the PRC while Thailand and the Lao PDR may end up paying large economic and social costs. It was therefore very important to ensure in such cases to align incentives and financing arrangements in a way that transit countries also benefit from cross-border linkages.

• Transaction costs in cross-border infrastructure are often quite significant and so returns have to be commensurate with such large costs.

• Cross-border infrastructure requires upfront external financial support. In the European Union, financial instruments are available for identifying and designing cross-border projects, so as to develop a large internal market and strengthen regional competitiveness. The European Community Budget finances part of costs using “structural funds” and the European Investment Bank plays a significant role in funding such projects. The funds available from the structural funds are below market rates; this implies some form of subsidy to promote cross-border infrastructure.

• Factors such as high fixed costs, long life of assets, and space specificity expose cross-border infrastructure to risks arising from high “sunk costs.” Before the project is built, potential investors are in the position of power, holding scarce capital and technologies required for the project. After a deal is struck and assets are created, the host-country governments have greater power in terms of setting rules on taxes, tariff regimes, or transit rights thus determining actual returns to assets so created.

Technical and spatial factors

• Geography is very important: though proximity does not automatically imply cooperative behavior, most successful cross-border infrastructure cases are found in contiguous areas. This is because geographical proximity provides ample opportunities for significant gains from economies of scale and scope.
• There are also a few sector specific factors: Different infrastructure sectors need very different levels of technical coordination and synchronization. The transport sector requires a much lower level of technical coordination compared to power trading which requires the maximum level of coordination in planning.
• Credible commitments are essential for such connectivity to yield real benefit of cross-border projects. For example, natural gas transportation needs exhibit a bilateral monopoly structure. Given the large transaction costs, new pipeline deals are often between a monopoly supplier of gas and a monopsonist buyer. Such projects have high risks if policy regimes are not credible.
• In sectors where technological innovations expand scales and such benefits are widespread, it is easier to support cross-border infrastructure network externalities that bring tangible benefits. For example, in the mobile telecommunications sector, enhancing connectivity is easier because market expansion benefits all consumers.

Social and environmental factors

• Cross-border infrastructure often connects isolated communities and thus opens up economic and social opportunities.
• Cross-border infrastructure is subject to negative externalities that need to be dealt with. For example, cross-border infrastructure has negative impacts such as the spread of HIV/AIDS, transborder pollution, or other factors that erode the social fabric, making communities vulnerable to external risks.
• Spread of knowledge, transfer of technology, and enrichment help build cultural capital of transborder regions. To the extent cross-border infrastructure helps in bridging a shared history, cultural values or norms create networks based on ethnic identity. This would help bring communities together and build trust, which is important for any kind of cooperation.
• Differences in demographics of individual countries determine the relative power structure among nations because population density differences influence cost and market viability.

Institutional and coordination

• Given the higher need for planning and coordination for cross-border infrastructure, formal or informal institutional arrangements are essential. Though in theory, project-to-project cooperation between states for mutual benefit does not demand a formalized institutional or legal framework, in reality such
an approach has a high failure rate and long lead time. An institutional coordination and enabling regulatory framework helps minimize such costs.

- The state plays an increasingly important role in cross-border infrastructure, even if the projects are in the private sector. However, where relationships are governed purely by commercial considerations, differences are more easily resolved.
- Institutional arrangements are also necessary because cross-border infrastructure often requires upfront external financial support. The transaction costs of preparing cross-border infrastructure are high.
- Cross-border projects in sectors such as power need harmonization of legal and regulatory frameworks, and standardization of rules and procedures.
- Differences in institutional and human capacities often become barriers to cross-border infrastructure.
- Regional financial markets help cross-border infrastructure.

**Lessons from GMS**

The GMS provides perhaps the benchmark for successful subregional and cross-border cooperation. Over its 12-year existence, it has steadily evolved from a disparate collection of wary neighbors into a highly effective collaboration that can now point to numerous infrastructure investments directly attributable to the GMS initiative. Moreover, it has accomplished this with a largely informal approach; GMS operates on a self-selection formula of “6 – x,” meaning only those who choose to involve themselves in any particular undertaking are bound by that agreement. Those who opt out are not pressured to participate nor do they constrain those who wish to proceed within their own territories. This approach contrasts with that of ASEAN which prefers unanimity, for which some have faulted it as functioning essentially at the pace of the slowest or the least persuaded of its 10 members.

With ADB serving as Secretariat, GMS members have adopted nine priority sectors: transport, telecommunications, energy, tourism, human resources development, environment, agriculture, trade, and investment. Specifically regarding infrastructure, individual subregional forums have been established for electric power, telecommunications, and transport. Traversing the subregion and reflecting the primary transport routings, five economic corridors (two North–South, one East–West, and two Southern) have been identified; several road investments are under way within these corridors while feasibility studies are addressing prospective railway improvements.
Plans for regional power interconnections and telecommunications backbone have also been drawn.

While external infrastructure funding has been substantial, there has also been an impressive employment of resources sourced from within the subregion. Examples include the Theun-Hinboun Hydropower project with the Government of Thailand, the private sector, and ADB, which enables the Lao PDR to supply energy to Thailand. These also include the North–South Corridor, with the PRC and Thai governments funding their respective road portions as well as providing loans/grants to the Lao PDR for segments of the intervening transit road. In this latter case, multilateral (ADB) involvement in actual project funding could thus be limited to only the relatively short remaining transit link through the Lao PDR. In fact, the working relationships that have been engendered through the GMS have also contributed to separate bilateral and multilateral initiatives. Examples of cooperative ventures involving member states but independent of the GMS umbrella include the Emerald Triangle Tourism initiative (Cambodia, Lao PDR, and Thailand) and the upper Mekong navigation plan (Lao PDR, Myanmar, PRC, and Thailand). All these financial collaborations are clear illustrations that the member states see individual as well as collective benefits from cross-border projects.

The success factors for the GMS include:

**Political Vision**: The leaders have seen the advantages and value-added possibilities of regional integration. In some sense, cross-border infrastructure plays an important role in achieving the results.

**Geography**: The GMS consists of a reasonably compact land mass wherein every member state shares borders with at least three others thereby making cross-border infrastructure and the benefits thereof an immediately recognizable concept.

**Economics**: The GMS is anchored north and south by the dynamic economies of the PRC and Thailand, increasingly eager for access to one another and to the intervening markets of relatively poorer members who are themselves poised to benefit from subregional trade and infrastructure initiatives.

**Sponsorship**: While there have been numerous bilateral and multilateral sources of support, ADB has assumed a central activist role, serving as a patient broker and neutral coordinator plus source of technical assistance and, frequently, of project finance.
Notes:


References:

