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Economic corridors in Southeast Asia: Analytical framework, development Impacts, and policy

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Hal Hill Jayant Menon

Abstract

Economic corridors have gained popularity as a potentially important instrument in the development and transformation of low and middle income economies. But why have some countries had more success with them than others? What role does governance, institutions, finance and policy frameworks play in determining their success? How can we measure their impacts? We try and answer these questions by looking closely at, and drawing lessons from, two case studies of successful corridors in Asia, Malaysia and Thailand. A key conclusion is that economic corridors are more likely to succeed with greater domestic spillovers when the physical and policy infrastructure are conducive.

Key words: Economic corridors, economic geography, Southeast Asia.

JEL codes: O53, R11, R58.

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1. Introduction

Economic corridors are an important feature of the process of economic development and structural transformation. They highlight the often overlooked spatial dimensions of economic development. The process of economic development entails rising incomes, changing economic, social and demographic structures, and institutional change. But it also results in an evolving spatial economy, including rapid urbanization and emerging economic agglomerations. These agglomerations, and the corridors they create, are driven by many factors, as the seminal work in the field (Krugman,

1991) emphasizes.[1] These include natural geographic factors (eg. natural deep-sea ports on rivers and the coastline), great population settlements (eg. more than half the world's population now reside in cities), and the economic activities that service them, major hubs that connect to international commercial routes, major natural resource endowments (eg. oil or mineral deposits) and their spinoff economic activities.

Government policies are central to the development and evolution of agglomerations and corridors. At the most basic level, expanding economic activities requires collective action to provide the essential inputs to sustain them. In traditional societies these commenced with transport networks and associated infrastructure services such as ports and water supply. In modern economies, comprehensive government planning is the *sine qua non* of successful spatial economies. Urban and regional planning requires land acquisition and zoning, the construction of road and rail networks, the provision of power, water and sewerage supplies, and the environmental amenities that accompany them. On any feasible scale, this package will occur only with concerted government action, minimally as the guiding planner and more commonly as the major provider. In turn, practically every facet of public policy is involved in such activities: finance, institutions, community governance structures (including local governments in the case of federal political entities), public-private consultations (and sometimes formal partnerships), education and health services, and much else.

Importantly, as the process of economic integration continues and international boundaries become ever more porous, these spatial constructs may straddle multiple international jurisdictions, either by deliberate design, as in the Greater Mekong Subregion (GMS) program and the Singapore-Johor-Riau (SIJORI) growth triangle, or driven by market fundamentals, or both. To be successful, these cross-border arrangements require wide-ranging government

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[1] Krugman opens his volume with a poignant reminder of how the Economics profession has overlooked the concept of 'space': 'I have spent my whole professional life as an international economist thinking and writing about economic geography, without being aware of it …' Krugman has returned to the subject on several occasions, notably in his 2008 Nobel Prize speech. For a more formal treatment of the issues, see Fujita, Krugman and Venables (1999).

involvement, from customs and transport harmonization and coordinated immigration procedures to multi-currency funding modalities and mutual recognition of skills.

This paper addresses these and related issues by seeking to answer the following questions. First, what is a working definition of an economic corridor? Second, is it possible to identify the best approach to the development of successful corridors, and what factors shape these successful outcomes? Third, what are some of metrics that can be used in order to delineate the development impacts of corridors, against their expected outcomes? Fourth, what are the key requisite policy reforms to promote corridors, in the context of broader spatial planning and urbanization initiatives?

This paper is organized as follows. Section 2 summarizes the general literature on the subject, develops our analytical framework, and provides a taxonomy of definitions and concepts. Next, in section 3, we examine a wide array of governance and institutional factors that shape the evolution of agglomerations and corridors. Section 4 investigates financing issues, in particular the special requirements of complex multi-modal projects with long gestation periods. Drawing the preceding sections together, section 5 assesses a key subset of spatial projects, physical infrastructure. Section 6 draws attention to the effects of countries' geography in the development of agglomeration and corridors, while section 7 reviews the challenge of uncertainty in project design. Section 8 illustrates the issues discussed in the previous sections by examining two country studies, Malaysia and Thailand, and placing their experience in broader context. Section 9 summarizes the key conclusions and draws out their policy implications.

2. Analytical Framework and Concepts

An *economic corridor* refers to a loosely defined geographic space that connects and integrates economic agents and facilitates the efficient movement of goods and services within that space, thereby linking the supply and demand sides of markets. These corridors have concentrations of economic activities and actors of varying density along them. At the simplest level, they may be viewed as a particular spatial economy that links two major urban economies or nodes.

A corridor will typically have at least one *gateway* that connects the corridor to the domestic and international economy. These gateways frequently take the form of major cities and centers of economic activity that spread out beyond the urban limits to adjacent regions. Large urban settlements may be regarded as *agglomerations* that possess some intrinsic competitive advantage and which grow by exploiting economies of scale and scope. However, while corridors are usually associated with agglomerations, the converse is not necessarily the case: the major urban center could be a hub with 'spokes' evolving around it but without one or two well defined economic corridors.[2] Corridors typically also feature one or more *clusters* of economic activity, that are spatially concentrated and usually exhibit a specialized set of outputs and activities (for example, a financial center, a weaving village, educational

[2] The most obvious example of an agglomeration with few immediate spatial linkages is an enclave mining complex. Some tourism resorts also operate in such a manner.

institutions, etc). These clusters may vary in size from very large cities to quite small settlements.

Corridors encompass a wide array of geographic modalities. The most commonly understood corridor is a collection of economic centers connected by land transport services, roads, railways and bridges. For archipelagic nations, maritime transport is obviously essential and dense sea transport routes may constitute a corridor, even if, unlike land-based corridors, there are no centers of economic activity between two given economic nodes.

One reason for the interest in economic corridors is the growing awareness that 'behind-the-border' reforms are just as important as trade liberalization. That is, as barriers at the border have generally declined in recent decades, the complementary reforms, including connecting the spatial (domestic) economy to the global economy, and that enable economic agents to take advantage of the opportunities of globalization, have proceeded more slowly. One likely consequence of this uneven pattern of reform is rising intra-country inequality, as the more internationally connected segments of an economy grow more quickly than the less connected regions, at least during periods of buoyant global economic activity.

In fact, economic corridors may also extend across international boundaries, especially as formal barriers to international commerce continue to decline and in cases where there is a well developed history of cross-border commercial interaction (such as for example Malaysia and Singapore). Moreover, as global value chains and production networks become an increasingly significant form of commercial organization, firms residing in economies with very different factor proportions may find such cross-border transactions commercially attractive. For example, high-wage, land-scarce Singapore has very close business ties with low-wage, relatively land-abundant Indonesia, particularly the proximate Riau Islands. In these cross-border arrangements, the drivers of the economic corridors are the same, but they do require inter-governmental cooperation and facilitation, to be discussed shortly.

The information and communication technology (ICT) revolution in the past two decades is transforming traditional definitions of economic corridors, and indeed the notion of 'space' itself. Economic agents now connect via technologies such as tele-commuting, electronic communications and e-commerce, a trend that is accelerating also as the share of services in the global economy continues to rise. Whereas the notion of proximity was traditionally geographically defined, as modified by physical transport nodes, ICT connections are not geographically defined. In fact, the uneven global spread of high-quality internet services may result in two distant locations being better 'connected' than physically proximate locations in regions with poor internet services. The resulting 'corridors' could therefore spread over great distances.[3] The implications for infrastructure planners are profound, as the earlier dichotomy, defined by personal movements between residence, workplace and shopping/recreational centers, undergoes major changes.

[3] One can readily think of many such examples. The proliferating Business Process Outsourcing (BPO's) operations in the Philippines have well defined commercial channels with their clients in the USA and elsewhere, and these arguably constitute major economic nodes. Distance higher education can also involve service delivery across great physical distances.

Central to an understanding of corridors, and a major reason for their analytical and policy appeal, are the notions of *externalities* and *spillovers*. That is, cities typically represent concentrations of high incomes, and associated skills and productivity. They are a collection of individuals and enterprises exhibiting these characteristics. The interaction of these economic agents therefore raises aggregate productivity: specialized input suppliers enhance the productivity of downstream users; there are demonstration effects that 'followers' imitate and absorb from those at the frontiers; a competitive environment encourages innovation; and the physical concentrations of skills (for example, in a major corporation or a university) creates a beneficial learning environment.

The evolution of these spillover activities may take several forms. They could extend spatially, which could be the nucleus of a corridor. They may develop strong complementarities with adjacent cities, which is therefore very likely to constitute a connecting corridor. Or congestion and other negative externalities could rise to the point where economic agents seek cheaper and more amenable locations beyond a given urban space.

Thus far the discussion has not considered the policy dimensions. But these are crucial and affect practically all aspects of the development of the spatial economy. We discuss this subject in more detail in section 3 below. Most government policies have implications for the spatial economy, of which the development of agglomerations and corridors is a subset. As will be shown below, many such policies have 'unintended' consequences.

In sum, it is useful to distinguish between the following major sets of policy interventions that directly affect the development of corridors. We elaborate on each of these factors in the following sections.

First, there is *hard infrastructure*, that is, the roads, railways, ports, bridges, and telecommunications that facilitate the movement of goods, services and people. This also encompasses efficient inter-modal connections, for example, bridges connecting road networks, railways servicing ports, electronic communications and physical connectivity operating hand-in-hand, and so on.

Second, there is *soft infrastructure*, which further facilitates the smooth flow of commercial transactions. This includes an efficient business eco system, from input suppliers to final consumers, together with a regulatory environment that ensures minimal disruption to these flows consistent with legal requirements. It also includes unhindered international transactions so that, for example, port logistics provide both efficient goods flow and speedy customs and immigration services

Third, there is the overall business environment, which provides an attractive commercial setting for economic agents to undertake transactions. This provides the core economic base to attract mobile factors of production to these agglomerations and corridors.

The literature on corridors and agglomerations, and the drivers of their success, overlaps substantially. As noted, the great cities of the world have typically developed on the basis of some natural geographic or commercial advantage. One is a port at the mouth of a river serving a major hinterland, such as New York, Shanghai and Tokyo. Another is a strategic trading location, such as Hong Kong and Singapore, where a combination of an open trading regime and government initiative to build efficient hard and soft infrastructure enables it to grow as an entrepot center, and then develop modern institutions that facilitate the growth of financial, legal and other services. There are also major technology centers, sometimes accidental in origins, but which generally have synergies with a strong educational base. Examples include Silicon Valley, Boston, Bangalore (Bengaluru) and Cambridge (UK). Some of these high-tech centers have in turned spawned well developed economic corridors, such as the 'Route 128' Boston Technology Corridor.

In all these cases, governments played a key role in infrastructure provision, both to the hinterland and internationally, that was central to their growth. Then agglomerations emerged, comprising a wide range of complementary, inter-linked manufacturing and service activities. A crucial common feature of these cities' dynamism was their openness to the global economy, for trade, technology, investment and (in most cases) people.

The competitiveness of cities, and agglomerations more generally, are central to the development of corridors given their role as gateways. Consistent with the analysis above of the drivers of successful corridors, the World Economic Forum (WEF, 2016) 'Competitive Cities' report emphasizes four key elements:

- institutions, including political leadership and the development of effective public-private partnerships;
- policies and regulations, at all tiers of government, and ranging from macroeconomic stability and openness to a business friendly environment;
- 'hard connectivity', including the physical infrastructure that underpins all transport and communications services; and
- 'soft connectivity', including a skilled labour market, efficient digital infrastructure, and trade facilitation.

A similar set of factors underpins successful agglomerations. At the most basic level, a physical cluster 'is the outcome of what entrepreneurs, firms and workers do.' (Nathan and Overman, 2013, p. 397.) The role of public policy is to enhance the productivity of these agents through education, transport policy, housing, and urban planning, in addition to the usual range of business policies. Targeted decentralization strategies may work if there are favourable predisposing factors, including local competitive advantages.

In practice, natural geography, government policies and specifically infrastructure provision are interactive factors. Infrastructure provision builds on the natural geographic advantages of strategically located cities, and the community's locational preferences to live in 'desirable'

regions.[4] But the infrastructure investment decisions also shape geographic patterns of economic activity. For example, firms and individuals choose to cluster around airports and along major road and rail networks. Therefore, government planners can shape patterns of economic activity by their investment decisions, especially in the case of countries with rapid population growth.[5]

There are of course limits to such a strategy. All countries have 'white elephant' infrastructure projects where planners have miscalculated the locational preferences of economic agents. Careful social cost benefit analysis is an essential building block of all major infrastructure projects, while also recognizing that these dynamic externalities and interactions are inherently difficult to measure.[6]

It is also important to emphasize the various, interlinked dimensions of spatial development policies. These include decentralization from central to local governments, cities and agglomeration policies, economic corridors, and other policy interventions with a specific geographic focus such as lagging regions and 'growth poles'. The general presumption is that these policies are positive sum game in the sense that, for example, a corridor project would have beneficial spillover effects for the broader region in which it is located. However, research on the European corridors (Witte et al, 2014) has cautioned that this may not necessarily be the case, owing to the large degree of spatial heterogeneity in most economies. For example, large agglomerations may on balance draw resources out of surrounding regions – the so-called 'backwash effect' – and be more connected to other international hubs than to the hinterland.[7] Specifically, these authors '…find only limited evidence for a corridor effect … on productivity and employment growth externalities.' Rather, consistent with the discussion above, it is likely to be the accompanying factors – the business environment, workforce skills and so on – that determine the success of these corridors. In a similar vein, the literature on the relationship between economic development and the level of decentralization is inconclusive, suggesting that other factors are likely to be more important determinants of economic growth (Martinez-Vazquez and McNab, 2003).

Economic corridors are also expected to contribute to poverty reduction, directly through faster overall economic growth, and indirectly by enabling the poor to connect to markets for their services and output. In particular, the literature on roads and rural poverty, where most of the poor reside, shows that this relationship operates through various channels.[8] The gap between farm-gate and retail prices for food produce narrows as better infrastructure enables

[4] This includes the growing popularity of various rankings of city livability. See for example the rankings developed by the Economist Intelligence Unit.

[5] Perhaps the most obvious example of governments directly influencing patterns of economic activity is the creation of national capital cities, such as Washington DC, Ottawa, Brasilia, Islamabad, Canberra and so on. Or shifting the capital's major administrative functions to the periphery, such as Malaysia's Putra Jaya.

[6] One complex but widely used aspect of such analysis is the notion of 'value capture' as a means of funding major infrastructure projects. That is, the project developers may fund their investment in part by being permitted to capture some of the appreciation of land values that occurs as a result of (for example) the construction of a major rail network.

[7] This is one of the criticisms of certain types of special economic zones, that place firms within them on a free trade footing with the international economy, but which erect trade barriers beyond the zone with the hinterland economy.

[8] See, for instance, Menon and Warr (2008), and literature cited therein.

more traders to enter food distribution markets, hence lowering margins. Circular commuting and migration employment options expand as rural workers are better able to access major urban labor markets. And better infrastructure induces major urban employers, facing geographically defined labor shortages, to relocate to rural areas, closer to the rural poor, where land and labor costs are lower.[9]

Finally, it is useful to note that two of the world's most widely discussed economic corridor projects involve Asian countries, and both are transnational in character. One is the Greater Mekong Subregion (GMS), which commenced in 1992 with six countries (Cambodia, Laos, Myanmar, Thailand, Vietnam, and Yunnan Province in China). Figure 1 shows the various economic corridors implemented or envisaged under the GMS Program. The GMS project was reportedly also the first occasion in which the Asian Development Bank formally employed the term 'economic corridors', in the promulgation of the East-West Economic Corridor (EWEC) program in 1998. The GMS has aimed to strengthen bilateral relations in the post-conflict environment and to promote connectivity through investments in infrastructure. Its projects have contributed to overcoming the severe infrastructure backlog in much of this region. Components of the program have also facilitated the emergence of economic corridors, particularly in cases where they build on strong economic complementarities such as the border zones linking the large economies of Thailand and Vietnam with their poorer, smaller less developed neighbors (ADB, 2015[10]).

Figure 1 about here

The second example is the largest economic corridor currently under discussion, China's Belt and Road Initiative (BRI). Its progress will also be a test case of implementation of the most ambitious transnational infrastructure project arguably ever contemplated in world history. A lot has been written about the BRI. (See, for instance, Hurley, Morris, and Portelance, 2019, Rimmer, 2018, Rolland, 2017, Cheng, 2016, Huang, 2016, Wolff 2016, and Swaine 2015.) There is no need to review the material again here, except to note that a greater level of uncertainty over the prospects of fulfilling the initial, ambitious plans has been cast into doubt following an expected growth slowdown and shrinking of the current account surplus in China as a result of the trade war, COVID-19 outbreak, as well as concerns raised by several recipient countries.

3. Governance issues

We have emphasized the importance of government policy in creating and facilitating efficient economic corridors. Practically every facet of government operations impinges directly or

[9] That is, urban 'labor scarcity' may co-exist with rural labor abundance owing to the fact that migration to and living in the cities may be prohibitively expensive for the rural poor. It therefore becomes more efficient for the urban capital to relocate to rural areas to access cheaper labor supplies, providing the complementary infrastructure is also provided.

[10] By contrast, the Brunei-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA), launched in 1995, has made little progress, owing principally to the absence of dynamic economies in much of the intersecting sub-regions and limited government investments in infrastructure. In recent years, serious conflict in parts of western Mindanao has impeded progress.

indirectly on corridors. Often it is the indirect – or unintentional – government policies that are the most significant. We now examine the many aspects of this issue in more detail.

Corridors are generally viewed by governments as a subset of spatial or regional policies, while public works and transport agencies are the arm of governments most likely to be involved with them. For major projects, an inter-agency authority is frequently established.

A key analytical consideration is that successful agglomerations and corridors are in part the result of collective intervention and coordination to overcome market failures. But the risks of 'government failure' can be just as great. Therefore, an overriding consideration is that public policy will only be as effective as the quality of the implementing agencies. Moreover, the role of the government is to provide an enabling environment in which private economic agents are able to flourish. A second major consideration is therefore the effectiveness of public-private partnerships at all stages, from planning to execution and to completion.

Project selection and appraisal

Major infrastructure projects typically emerge as a result of some sort of political process. A multitude of factors may be present. Governments see infrastructure projects as a means of developing lagging regions; of seeking to win the support of a particular constituency;[11] or simply responding to a pressing need, such as a highly congested city.

Thus all major infrastructure projects will inevitably have a political dimension. However, once the broad objectives have been established, the most successful ones will proceed on the basis of non-political professional expertise and *rigorous cost-benefit analysis*. Such an approach may take a variety of institutional forms, from an independent and transparent infrastructure advisory board to strong and apolitical agencies responsible for public works.[12]

Related, *independent scrutiny* of major infrastructure projects is essential. With declining international trade barriers, historically a major source of rent-seeking, these projects present lucrative opportunities for corruption. Large property developers and construction firms are very often the major contributors to political parties. Since each project is in effect *sui generis*, cost benchmarks are often not readily available owing to the inherently opaque nature of infrastructure projects and funding. The most common check on such malpractice is some sort of well-funded independent anti-corruption agency, which has the authority to initiate

[11] This explains the well developed proposition – illustrated later in the Malaysian case study – that, in competitive political systems, marginal seat constituencies tend to receive disproportionate public resources, whether through capital works, trade protection or other selective interventions.

[12] Even countries like Malaysia with a history of building efficient infrastructure have a mixed record in undertaking cost-benefit analysis. For example, as noted below, the plan to build a major new airport just 46 km from the well-established (but under-resourced) Penang airport.

investigations and undertake prosecution. There is now considerable evidence available on best-practice in this field.[13]

Land acquisition issues can present a major obstacle to major corridor projects, which invariably require greenfield sites. This is a particular problem in densely settled countries with poorly developed land titling, and where past acquisition practices have resulted in unresolved grievances. Indonesia is a case in point as all three features are present, resulting in protracted delays for many road and other projects (McCarthy and Robinson, eds, 2016). The problem is also common in the South Pacific countries. The solution is transparent, quick and equitable land acquisition procedures.

Successful spatial planning, including the development of corridors, requires effective *inter-agency and inter-jurisdictional coordination*. Large projects are typically initiated by central governments, even in federal political systems, since these governments are more likely to have superior administrative resources and borrowing capacity. Their involvement is obviously required in projects that straddle jurisdictions. But local government cooperation is essential, both to ensure local community involvement, and for the provision of complementary infrastructure, such as feeder roads connecting to a major highway.[14]

Inter-agency coordination within the same tier of government is also crucial. By definition, spatial plans involve many government ministries and agencies, including public works, transport, communications, environment and commerce. These arms of government frequently operate as 'silos' and have different priorities, with the result that their policies may not always be consistent.

More broadly, the evidence is mixed on whether different administrative and political systems have implications for the quality of spatial planning. As noted, the degree of decentralization does not appear to be a significant variable in cross-country growth regressions. One may reasonably conjecture that, given the special characteristics of infrastructure investments, notably long gestation periods and large capital investments, countries with fluid political systems, short time horizons and significant checks on the executive may struggle to implement large projects efficiently.[15]

The challenges are inevitably more significant in the case of projects that straddle international boundaries. Not only are there the domestic challenges adumbrated above, but also the different institutional procedures, funding modalities, development priorities and business practices of the participating countries have to be welded together. In the case of an economic union with strong supra national authority and procedures, and completely open borders, such

[13] See for example Krongkaew (2017), which draws on his first-hand experience as a commissioner at the National Anti Corruption Commission of Thailand.

[14] See Hutchinson (ed, 2013) for some case studies (including Penang) on the role of subnational governments in Asian economic development.

[15] This emerged as a theme in the special issue of the *Asian Economic Policy Review* on "Connectivity and Infrastructure", 11 (2), July 2016, especially the papers on India, Indonesia and the Philippines.

as the European Union, these challenges can be overcome. But most developing Asian countries do not yet have such an institutional form. Even relatively straightforward agreements with strong potential economic complementarities, such as SIJORI, the Singapore-Johor-Riau growth triangle, have had limited success. The political and financial support of an international agency may be required to play a catalytic role. This has therefore been an area of substantial ADB involvement.[16]

Regulation

A major theme of this paper is that successful corridors require a package of high quality hard and soft infrastructure, together with a conducive business environment that attracts mobile factors of production. An important element of this environment is a competitive climate, and in turn the regulatory framework that underpins it. In some cases the policy recommendations are straightforward: open skies in the case of civil aviation, minimal barriers to entry for telecommunications providers, and so on.

But as noted elsewhere much infrastructure provision has 'natural monopoly' characteristics, in that the long run average cost curve is downward-sloping for all feasible levels of output. For example, except for very large cities, most urban settlements are typically served by just one airport and one port. Inter-city transport routes will have just one major trunk road. Power transmission (but not necessarily generation and retail supply) is another common example. What is needed in these cases is an independent, transparent regulator that protects the public interest and restrains the monopoly (or quasi monopoly) provider. International service quality benchmarks can provide a useful guide in these cases.[17]

4. Finance

Finance is a key variable in the establishment of economic corridors, owing to their large scale, the long gestation periods, the regulatory arrangements that provide the enabling environment, and the 'natural monopoly' characteristics that are a feature of some infrastructure provision. We briefly consider each of these in turn.

First, all major spatial planning exercises and infrastructure projects require government involvement, most require direct government support, and most of this government support is at least partially subsidized, that is, on a less-than-user-pays principle, especially for the road network. Hence, the state of the government's fiscal health is a crucial variable, which in turn is dependent on its general macroeconomic management and its revenue-raising capacity. In periods of economic recession, capital works are generally the first budget item to be cut.

There is in addition the special case of very large infrastructure projects in very small economies, where poorly selected and designed infrastructure investments could have

[16] See McCawley (2017, pp. 278-9) for a summary of ADB activities in this field.

[17] Such as the service standards set by a best-practice agency, for example the Port of Singapore Authority for shipping, or comparative indicators and perception surveys reported in the World Economic Survey and similar such exercises.

adverse macroeconomic implications, including even the possibility of triggering a debt crisis. For example, some of the envisaged official Lao borrowing commitments under the GMS and China's BRI projects could conceivably be of such a scale. In the smaller 'Stan' economies, official borrowings for planned major infrastructure projects, mainly under the BRI, are estimated to be equivalent to up to three-quarters of the country's GDP. Borrowings of this magnitude could also trigger a macroeconomic crisis, especially if the projects are not subject to rigorous CBA.

Second, by definition major infrastructure projects require long-term financing resources. But capital markets in most Asian developing economies are shallow and predominantly short-term in orientation.[18] This applies not only to the formal banking sector, but also the stock market, where trusted information flows, regulatory supervision, and protection of minority shareholder interests are still in their infancy, thus discouraging the entry of investors willing to take a long view. Infrastructure providers that are listed on major international stock markets are also hesitant about investing in countries with an uncertain business environment for projects of long duration. In addition, bond markets, which are a common means of funding infrastructure in advanced economies, are still relatively underdeveloped in most Asian developing countries.[19]

Third, most major infrastructure projects in developing economies require external funding and expertise. Frequently the most efficient way of procuring these resources is through foreign direct investment (FDI), where the foreign partner also has a direct stake in the successful completion of the project. FDI participation may also facilitate access to the international financial centers that may otherwise not be available. Therefore, open FDI policies, including supportive legal and regulatory regimes, will contribute to the successful development of economic corridors. It is no coincidence that countries with more restrictive approaches to FDI have also struggled to complete major infrastructure projects.[20]

Fourth, successful economic corridors require both public and private participation. In some cases, (including in the two country studies to be discussed later), the division is primarily one in which the public sector provides the infrastructure while most of the economic activity within the corridor is undertaken by the private sector. However, in times of constrained budgets, governments are increasingly attracted to the concept of public private partnerships (PPP's) for the infrastructure provision itself. While attractive in principle, the experience with PPP's in developing Asian economies is mixed. (Deep, Kim, and Lee, 2019, Leigland, 2018, Lee et. al, 2018.) Without a clear division of responsibilities and tasks, and measures that protect the public interest, these arrangements have often resulted in profits being privatized and losses being socialized, ie, as pubic debt. Several have resulted in protracted legal and financial disputes, especially during periods of economic crisis.[21]

[18] See for example Park and Lee (2011).

[19] See for example the ADB's online bond website: https://asianbondsonline.adb.org/

[20] See for example Llanto's (2016) discussion of this issue in the Philippine context.

[21] For a detailed study of this issue, on the collapse of many major foreign-funded infrastructure projects in Indonesia after the Asian financial crisis, and the subsequent extended and costly financial workouts, see Wells and Ahmed (2006).

Finally, as highlighted in the previous section, regulatory certainty is a pre-requisite for access to long-term financial resources. Here also, the special characteristics of infrastructure projects are relevant: their longevity, and their visibility in everyday household budgets, render their pricing vulnerable to political interference. The propensity for legislators to enact price suppression measures, for example in electricity services and road tolls, is legendary, particularly in weak polities that are susceptible to populism.[22]

5. Infrastructure issues

A key theme of this paper is the importance of high-quality physical infrastructure as a necessary – but not sufficient – condition for the development of efficient economic corridors, and agglomerations. Much economic connectivity simply cannot take place without good roads, reliable power supplies, and the ancillary infrastructure. It is therefore useful to review the five, interrelated dimensions of successful infrastructure provision. Some of these topics are examined in more detail elsewhere in the paper.

First, secure and viable funding and pricing arrangements are the bedrock of any major infrastructure project. If there is government funding, there needs to be budgetary commitments for the life of the construction phase at the very minimum, and for ongoing maintenance thereafter. Many projects fail to meet this most basic of requirements, resulting in incomplete constructions or shoddy quality. Frequently these are attuned to electoral cycles, from pre-election commitments that cannot be sustained. Similar observations apply to the sustainability of private and external funding sources, especially given the special characteristics of the private construction industry in most countries, including the boom and bust nature of the construction cycle and the importance of political connections in securing major contracts. In addition, pricing is an important consideration to ensure the ongoing sustainability and maintenance of infrastructure projects, especially given that price suppression of utilities is a popular legislative tactic in many countries.

Second, given the special characteristics of infrastructure projects, a sound regulatory framework is essential. Many of these projects are quasi natural monopolies, for example, a major national highway, an international airport or port, a national power grid. To protect the public interest, some sort of independent regulatory agency is required to ensure that satisfactory pricing and service standards are met. International benchmarking can be a useful tool in the case of services that are not readily tradable. One of the challenges in establishing such an agency is to ensure that efficient services are provided without unduly complicating the commercial operating environment.[23]

Third, where these natural monopoly characteristics are not relevant, the guiding policy principle should always be competitive markets. This applies to civil aviation, land and sea transport services, power generation, telecommunications and any other competitively provided service. Some of these industries feature high levels of firm concentration that are

[22] See McCawley (2015) for a discussion of this issue in the Indonesian context, but one which is of general applicability, especially in fluid democracies.

[23] Some of the country studies in the 2016 *Asian Economic Policy Review* issue on connectivity allude to this challenge, for example the Indian and Philippine studies.

deeply embedded in political and bureaucratic structures. An open FDI regime may be the only feasible means of achieving more competitive outcomes.

Fourth, inter-modal connectivity is an essential feature of an efficient infrastructure system. Airports and ports need to have seamless connections to rail and road networks.[24] A civil aviation deregulation package needs to have anticipated the subsequent increase in passenger traffic. Major road projects need to have a complementary secondary road network constructed around them. Energy, water, sewerage and IT services need to be built in to a planned economic corridor. A frequent policy challenge is that the government agencies overseeing the development of these services operate as semi-independent 'silos', and thus the necessary coordination is absent. A special authority coordinating the work of all relevant government agencies for a specific project may be a solution. However, this is no panacea. Bureaucratic turf wars may persist, and in any case the authority usually only has remit for a defined geographic sub-region.[25]

Fifth, infrastructure provision has to be designed to operate effectively across a diverse spatial economy. Specifically, at least three different types of physical infrastructure are required. Each of them has their own specific finance and regulatory modalities, and each is relevant to the establishment of economic corridors. The first is transport within major urban agglomerations, where some sort of mass transit system will generally provide the most efficient backbone. This is the infrastructure challenge that many Asian developing countries find the most difficult, owing to the huge capital costs and the entrenched business interests in road transport. The second is efficient international gateways, and the smooth movement of goods and people through airports and ports. The third is the integration of the national economy, to ensure that the major urban agglomerations and international gateways connect to the hinterland. The weaker these connections, the more the international hubs operate as enclaves, resulting in rising urban-rural disparities and increasing inequality. This challenge also highlights the important role that economic corridors can play in facilitating this connectivity and integration.

6. Geography

The concepts of corridors and agglomerations apply to all locations of economic activity. But the specific shape they take, and the requisite infrastructure modalities, will be influenced by a country's geography, combined with its international orientation. We illustrate this proposition with some examples drawn from ADB member countries.

[24] A related consideration is that the mode of transport will depend on the geographic space under consideration. For example, the transport economics literature indicates that air transport becomes more competitive than road transport at distances in excess of 500 kms. Of course this is just an indicative figure: many other variables are relevant, especially the density of population settlements and the location of transport nodes. The calculations also differ as between passenger and freight traffic.

[25] Partial and uneven policy and bureaucratic reforms can have major economic consequences, as illustrated in the Philippine case. The country has achieved great commercial success with its BPO's. These are internationally oriented service exports that are connected to the unskilled and semi-skilled segments of a global value chain. However, in the case of manufactures, the country has very limited participation in these global production networks. This is principally because the latter require the speedy movement of goods through air and seaports, but Philippine logistics services at the border lag behind regional benchmarks.

First, it has long been recognized that land-locked countries have special infrastructure and logistics requirements.[26] At a minimum they require cooperative arrangements with contiguous countries that possess international ports. These arrangements include unobstructed land corridors to the port and seamless, integrated customs procedures, including customs inspection in the land-locked country that is recognized by its neighbors. These countries will therefore have a stake in the development of transborder economic corridors that include provision for the free movement of goods and services.

For the one Southeast Asian country that is landlocked, Laos, workable arrangements have been devised involving neighboring Thailand and Vietnam, and facilitated by the cooperative ASEAN framework and by the various GMS initiatives. Where the landlocked country is a small one, as in the Lao case, their international air transport will also likely revolve around neighboring country airport hubs.

Second, for archipelagic states, the corridors will likely involve sea transport and support infrastructure, particularly harbors. This is evident in the case of Indonesia and the Philippines, the two largest archipelagic states in the world. These countries have planned 'maritime corridors'[27] which include a package of efficient shipping services, port facilities and land connections. A 'port on every island' is an integral component of these plans. For a variety of reasons, both countries have struggled to develop efficient domestic shipping networks, let alone ones that are internationally integrated.[28] A subset of such sea transport networks is maritime river transport, where similar regulatory and investment issues arise. In the case of major water systems, such as the Mekong, the rivers themselves may constitute an informal transborder transport corridor.

A third category refers to densely settled, less outward-looking economies, typified by India, where the economic corridors typically run between major urban centers within the country. Here the major challenge is to develop efficient land transport networks, together with ancillary services. In this context, Rana (2016) presents a comprehensive analysis of India's East Coast Economic Corridor. He emphasizes four key agendas for successful realization of the proposal: a conducive investment climate to attract and support enterprises within the corridor; supportive logistics to ensure the smooth movement of goods and services;[29] the provision of enablers for industrial development, particularly land supply; and synchronized urban development both at the 'gateways' and along the corridors.[30]

[26] There is a large cross-country empirical literature concluding that being land-locked has a negative effect on country's economic performance. However, associated variables (location in Africa, conflict, the collapse of the former Soviet Union) are likely to explain at least some of these results.

[27] Such as President Widodo's current, ambitious 'poros maritim'.

[28] See Llanto (2016) and Sandee (2016).

[29] Like Malaysia, India has a federal political system, and therefore this element also includes inter-state coordination mechanisms.

[30] See also Singh and Kathuria (2016) for discussion of these issues in the Indian context.

A fourth category includes the outward-oriented city states such as Hong Kong and Singapore, for which international commerce is their lifeblood. One of the keys to their survival is highly efficient airports and ports; not surprisingly these two cities generally rank at the very top of international logistics comparisons. Both cities also operate as highly efficient gateways to a hinterland that straddles customs and migrations zone.

Finally, there are countries with extended coastlines and relatively narrow hinterlands, such as Vietnam (and also Chile). In these cases coastal shipping services are likely to constitute a backbone of the transport and logistics network, and hence they form a natural economic corridor. Feeder road and river networks therefore develop as an ancillary to the ocean corridor and, as with the Indian corridor example, the challenge is to efficiently provide the ancillary support facilities.

7. Uncertainty

At several points in the above discussion we have referred to some of the uncertainties that are inherent features of spatial planning exercises, particularly as they affect infrastructure projects. These are crosscutting considerations that are relevant to practically all these issues, so it will be useful to briefly review them. Major infrastructure projects are by definition capital-intensive and have long gestation periods. While they need to be subject to rigorous cost-benefit analysis, these exercises are typically more complex than is the case for conventional business decisions. In most cases, the sources of uncertainty are not easily amenable to formal modelling. But at least they need to be recognized, and arguably built in to upper and lower CBA estimates.

The first and most obvious source of uncertainty is the long-term cost of capital. For almost a decade global interest rates have been exceptionally low, owing to the aggressively loose monetary policies in the advanced economies. Will these very low rates persist for the foreseeable future, including in the aftermath of the COVID-10 pandemic? There are various schools of thought on this subject, but no definitive guidance. For example, according to one influential conjecture (Summers, 2016), the savings-investment equilibrium may settle on a permanently lower interest rate owing to secular stagnation in the advanced economies (and hence low investment rates) alongside buoyant savings in dynamic emerging economies.

Second, how might technological innovation affect the spatial economy, including the demand for transport and communications services? There are numerous plausible scenarios that need to be considered:

i) International service provision may no longer require individuals to move across borders to deliver or receive a service. This is already occurring through distance education and tele-medical services, and it has been accelerating during the current COVID-19 pandemic.

ii) The growth of e-commerce and cross-border, internet-based service provision (such as business process outsourcing operations) is reducing the demand for the physical delivery of such services, and the associated movement of people.

iii) The coming revolution in the generation of renewable sources of power generation is altering the economics of power transmission networks, for example, with greater localized power generation networks as compared to the major national grids.

iv) The continuing rise of global production networks and their supply chains is increasing the number of intermediate international transactions (and hence physical movement of goods) required for the production of a final good (Athukorala, 2014a).

v) Robotics could have a major, as yet unknown, impact on transport networks, for example, the rise of driverless cars.

Third, what are plausible global and regional economic growth prospects, and hence international trade volumes? Is the current slow growth the new normal, owing to a secular slowdown in technological progress and hence productivity growth? (Gordon, 2016) And what of the prospects for the major economies, in particular China, and whether it may experience a hard landing as its growth slows?

Several additional sources of uncertainty could also be mentioned. For example, major international regulatory changes may affect transport and connectivity. The rise of containerization in shipping half a century ago dramatically reduced sea transport costs. The rise of budget airlines in the past two decades lowered the cost of international air travel significantly, and with it the relative attractiveness of air travel compared to land transport alternatives. It also called forth major infrastructure investment requirements in new airports and connectively to land transport corridors.

An additional unknown variable is climate change, both the science itself and the international response in mitigation strategies. It is likely that the mix between fossil fuels and renewables in power generation will continue to change quite rapidly. How will this affect various transport service modes, and the infrastructure investments that underpin them? A related consideration is the likely trend in real energy prices, which are a major component of most transport systems. Most forecasts have failed to predict the level, much less the volatility, of global energy prices, owing to major uncertainties with respect to both supply and demand variables.

8. Two Case Studies, Malaysia and Thailand

Malaysia and Thailand provide interesting country case studies of the role, development, and impact of economic corridors. While Malaysia has employed economic corridors to try and pursue development of lagging regions within the country, Thailand has tried to use them to promote its dynamic automotive sector, while also addressing regional development objectives. Since both Malaysia and Thailand have been among the world's most dynamic economies, latecomer developing countries can look to their record for 'lessons from success'.

Both the Malaysian and Thai case studies examine land-based corridors, with the minor exception of Penang, an island in very close proximity to the mainland of Peninsula Malaysia.

We consider each case study in turn, below.

Malaysia has experimented with various corridors and special economic zones, with five corridors currently under implementation. Even in the current environment of fiscal austerity, the government remains committed to these projects. Athukorala and Narayanan (2018) provide a comprehensive assessment of economic corridors in Malaysia, and focus on the most advanced of these, the Northern Corridor Economic Region (NCER).

The NCER is located in the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) and sits along the maritime trade route of the BRI. It encompasses the four northern states of Peninsula Malaysia – Penang, Kedah, Perlis and Perak. The four states together account for about 16% of Malaysian GDP, with Penang's GDP per capita being about double that of the other three states. The NCER was justified on the grounds that the more developed state of Penang, with its excellent air and sea international connections, would serve as a gateway to the three poorer, hinterland states, which are nevertheless more richly endowed with land and natural resources. Penang plays a key role in the Malaysian economy as the initiator of the country's export-oriented electronics industry and its proliferating ancillary activities. It is also an important regional services hub for education and health (Athukorala, 2014b). An additional consideration for the NCER was that it extends through to the Thai border, thus opening up the possibility of strengthened cross-border commerce, consistent with the objectives of the IMT-GT.

The federal government created a supra-state authority, the Northern Corridor Implementation Authority (NCIA), with a Council chaired by the then prime minister, Najib Razak, to implement the project. The NCER's thrusts and priorities have been laid out in three strategic documents: the original NCER Blueprint launched in 2007 prepared by Sime Darby Berhad; a successor, Blueprint 2.0 adopted in 2016, and the current Strategic Framework, which runs through to 2030. The present Strategic Framework covers six priority sectors: services, manufacturing, agribusiness, petrochemical, green economy, and mining.

Through to the end of 2018, the NCER has attracted investments totaling RM-96.7 billion and created 119,819 jobs. Domestic investments accounted for 58% of private investments, with foreign direct investments making up the remainder (NCIA, 2018). However, most of the infrastructure projects have been running behind schedule, while few of them have been subject to rigorous cost-benefit scrutiny. There has also been limited discernible catch-up in the poorer hinterland states.

Therefore, while stressing that the NCER remains work-in-progress, the authors' interim conclusion is that the project has under-performed against its original objectives. A key factor in this under-performance, they maintain, flows from the country's '… federal system of government and the adversarial system of parliamentary democracy (p. 33).' In particular, while the projects were mainly funded by the federal government, there was only limited consultation and coordination with the relevant state governments and local stakeholders. Partisan politics further exacerbated the difficulties, especially '… when federal and state

governments are controlled by rival parties, as in the case of Penang, a key state in the NCER (p. 35).'

We turn next to the case of Thailand. In contrast to Malaysia, this case study views the development of corridors through the lens of the country's successful automotive manufacturing corridor. We benchmark our survey on the analysis of Warr and Kohpaiboon (2018), who trace the evolution of the industry as the major Southeast Asian hub for automobile production, and link its development to the Eastern Seaboard corridor project. They emphasize that there were two sets of factors explaining the country's success in attracting footloose, export-oriented manufacturing. The first was the construction of the high-capacity deep-sea port of Laem Chabang, and associated high-quality physical infrastructure. The second was the policy liberalizations introduced in the wake of the Asian financial crisis that allowed 100% foreign ownership in selected manufacturing activities and diluted the formerly restrictive local content requirements. The authors also conjecture that for historical and cultural reasons Thailand has been a favored destination for Japanese investors abroad, and firms from this country led the country's internationally oriented automotive success.

Planning for the ESDS was triggered by the severe congestion in Bangkok and its upstream port on the Chao Phraya River. The government's approach was to undertake the large-scale physical infrastructure investments directly, while the private sector provided the industrial estates adjacent to this infrastructure and then encouraged private firms to locate there. The government did not specifically target the automotive industry.

The authors draw attention to the success of Thai spatial planning with the following observation:

> '… the development of a national economic corridor, adjacent to the capital of Bangkok, was instrumental in the success of the export-oriented Thai automotive sector since 2000. The reason was that, in conjunction with other policy changes …, the publicly provided transport linkages, electricity supply and water supply facilities developed under the program known as the Eastern Seaboard Development Scheme (ESDS) facilitated the linkages between final manufacturers … and parts and components suppliers … and connected them to the international market (p. 3).'

The one caveat they attach to this record is that the decentralization policies pursued by the government through the Board of Investment (BOI) were at variance with the ESDS, in that the largest fiscal incentives were granted to firms that located in the more distant regions, which did not include the ESDS. Hence they conclude that 'the decentralization policy of the BOI was a failure (p. 7).'

Looking back at the ESDS and with the benefit of hindsight, this was of course one of Thailand's most successful government-initiated large investment projects. Ex ante, the project risks were presumably quite large: the extraordinarily rapid economic growth that Thailand enjoyed for the decade after 1985 was by no means assured at that time. Nor was

the dramatic industrial relocation from Northeast Asia to Southeast Asia in the wake of the 1985 Plaza Accord fully anticipated. A further fortuitous factor in the Thai success was the policy missteps in its major ASEAN neighbors, with Indonesia and (particularly) Malaysia embarking on disastrous national car projects, while China, the Philippines and Vietnam (and India) were not then viable production centers for MNE automotive firms, and Singapore had decided that its industrial priorities resided elsewhere.

This project arguably illustrates both the benefits of (relative) openness, which creates the opportunities for an economy to reap global commercial opportunities, but also the dangers of embarking on major public investment projects of a scale that, were they not to be economically viable, could have jeopardized macroeconomic stability. The key policy makers of that period surely deserve credit for their bold strategic vision.

In retrospect, what are the lessons to be drawn from these two country case studies? First, we note that both are open, trading economies. This has several implications for corridors and agglomerations. One is that connections to the global economy through sea and airports play a key role as gateways to corridors, especially in export-oriented economies. Another is that a sizeable export sector exerts political pressure on governments to ensure at least minimum standards of competitiveness and efficiency in the design of major infrastructure projects. In addition, open FDI regimes mean that these countries are able to tap into international infrastructure providers for capital and technology.[31]

Second, both countries have a history of mostly stable macroeconomic management. A distinguishing feature of the Malaysian and Thai economic histories is the absence of macroeconomic crises, apart from 1997-98. This is important, as macroeconomic crises often lead to fiscal stress and in turn the deferral of capital works projects.

Third, Malaysia and Thailand rank quite highly on various international infrastructure rankings, such as the World Bank's Logistics Performance

Index. In fact, their infrastructure rankings are generally higher than their per capita GDP rankings. It is important to keep this fact in mind when evaluating the various problems that are analyzed in the case studies.

Fourth, notwithstanding the significant governance challenges in both countries, especially over the recent past, and in spite of very different political systems, for the most part, both countries have a history of reasonably effective bureaucratic organization and project implementation. It is notable that the land issues do not feature prominently in the two country case studies. Sustaining financing for infrastructure projects also does not appear to have been a problem in both cases.

[31] The contrast here with Indonesia and the Philippines, with their more restrictive FDI regimes, is significant. See Sandee (2016) on Indonesia and Llanto (2016) on the Philippines.

However, the Thai case study provides an illustration of what could happen when inter-agency coordination is weak or agencies operate as 'silos': the fiscal incentives offered by the Board of Investments to encourage decentralization were at odds with the government's major Eastern Seaboard Project.

One significant difference between the two countries concerns their political systems: Malaysia is a federal state while Thailand is a unitary state. This has been one of the reasons for Penang's dynamism, but as the Malaysian case study shows the country's federal political system has complicated project implementation. The Malaysia study alludes to the occasionally problematic relationship between the federal and state governments in implementing the NCER, even when the same political party was in power in both tiers of government.

Finally, the Thailand case study is instructive in illustrating the role of uncertainty in the success or failure of economic corridor projects. Ex post Thailand's Eastern Seaboard project was a success, but ex ante there was considerable uncertainty. As the authors note, until 1997 its facilities were greatly underutilized. The country's leading think tank, the Thai Development Research Institute, regarded it as a 'white elephant'. Its success was due not only to its effective implementation but also to the major relocation of the Japanese automotive industry to Thailand following the Plaza Accord, in addition to the unexpectedly fast liberalization of the country's trade regime in the wake of the Asian financial crisis. Ironically, they note, the crisis 'saved' the project.

9. Summing Up

Governments in developing countries in Asia, working with multilateral and bilateral donors, have invested substantially in the development of economic corridors. Well-constructed and implemented economic corridors have a potentially important role to play in promoting economic development in these economies. As international barriers to trade continue to decline, 'behind-the-border' barriers to domestic and international economic integration need to be addressed. Where these corridors straddle international boundaries, they can also promote regional cooperation and integration.

However, like all spatial planning initiatives, the economic and institutional environment in which they operate will have a crucial bearing on their success. This applies not only in the narrow sense of well designed and cost-efficient physical infrastructure but also in the broader sense of the accompanying soft infrastructure and a business-friendly environment that attracts and supports a vibrant private sector. These elements are all essential prerequisites; underperformance in any one area will likely jeopardize the overall success of the project.

Indeed, it is surprising how often this fundamentally obvious proposition is overlooked. It is unlikely that economic corridors can make a significant economic contribution in inward-looking economies, so a country's trade regime matters. Moreover, host countries and international development agencies need to develop an integrated package in which the provision of physical infrastructure is a necessary but not sufficient condition. For example,

high quality physical infrastructure at international gateways may be undermined by slow customs procedures. A lack of inter-jurisdictional coordination, particularly between central and local governments, may undermine otherwise seamless connectivity between road, rail and sea transport. Government agencies accustomed to operating as 'silos' may result in the under-provision of crucial ancillary infrastructure such as water supply and telecommunications.

It also needs to be emphasized that corridors require a unique set of policy implementation skills that are not easily transferable from national to local governments. The Malaysian case study illustrates this proposition. This country has been one of the most successful economies over the past half century. But its various corridor projects have had mixed results, and in some cases have encountered local political and institutional difficulties.

At the same time, it is important to keep in mind what economic corridors can and cannot be reasonably expected to achieve. Successful corridors can contribute to a more balanced spatial economy, to relieving the pressure on highly congested urban agglomerations, to connecting the hinterland regions of an economy to the international economy, and to improving mobility options and living amenities for a growing population. But they cannot be expected to be a panacea for all manner of socio-economic development challenges. They can only complement, rather than substitute for, a comprehensive regional development program, and the chances of their succeeding are enhanced by conducive trade, investment and macroeconomic policy environment and conditions.

In fact, some of the criticisms of corridors overlook the basic 'assignment principle'. If inequality is a high priority, the main policy approaches will be tax and transfer measures, and inclusive education and labor market policies. For environmental degradation, the solutions will be tighter property rights, stricter environmental safeguards and taxes on negative externalities. If regional disparities need to be reduced, central government transfers to lagging regions need to be redesigned, and so on.

The issues discussed in this paper, along with the country experiences considered in some detail here, suggest the following key lessons for future design and implementation of economic corridors. First, it is important to establish an analytical framework that will enable countries to ascertain what corridors can and cannot be expected to achieve, and how to maximize their socio-economic benefits. Second, it is useful to involve the private sector in the financing of these large, long-term projects involving many stakeholders. Third, it is important to develop regulatory mechanisms that support a conducive business environment while protecting the public interest in the many cases of quasi natural monopolies in infrastructure provision.

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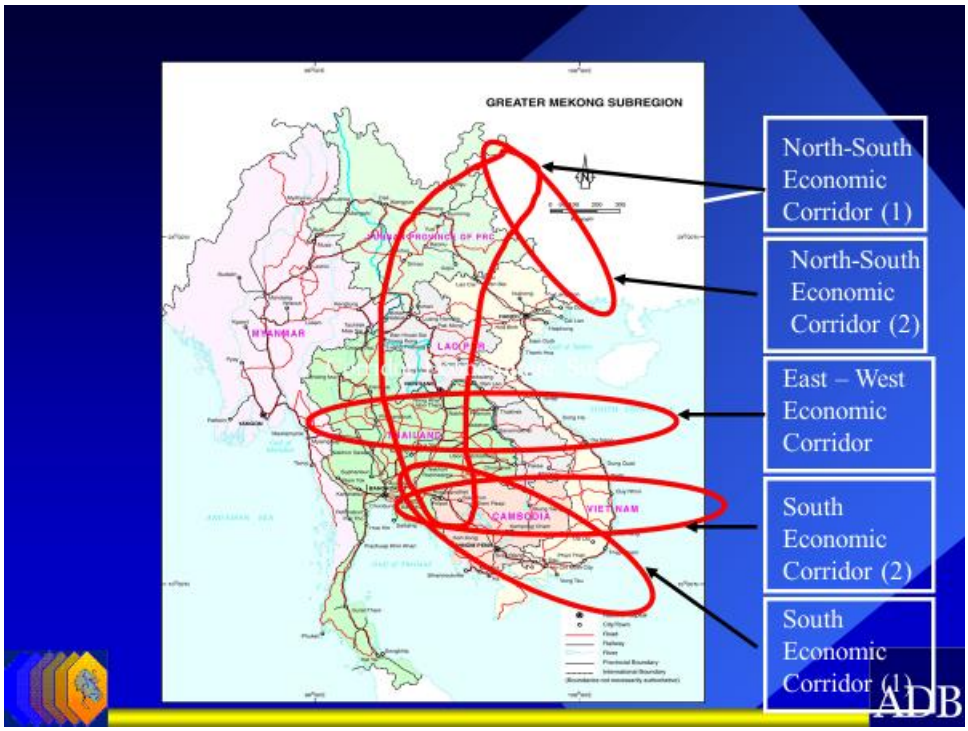
Figure 1: Economic Corridors in the Greater Mekong Subregion (GMS)



Source: ADB (2005)