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Contents

Abstract

Regional corridors are popular components of regional cooperation initiatives and have been in use for several years. Yet discussion about development of these corridors tends to be relatively general in scope and difficult to pin down in terms of content and implications. This paper elaborates on a simple framework for regional corridors development in the context of regional cooperation, anchored on two dimensions of these corridors: the extent to which they are national or regional and the area of their utilization. The framework is subsequently applied to the Greater Mekong Subregion (GMS) regional cooperation program, yielding several implications for its future. The GMS program needs to redefine what constitutes a regional project and to formulate a regional master plan for further development of GMS regional corridors. The framework is also applied toward identifying an appropriate methodology for monitoring performance of regional corridors.

I. Introduction

Regional corridors are an important part of the toolkit for regional cooperation initiatives. Several corridors are promoted under regional cooperation initiatives in sub-Saharan Africa, such as the Common Market for East and Southern Africa and South African Development Committee.[1] In the Asia and Pacific region, regional corridors are frequently promoted by regional cooperation initiatives supported by the Asian Development Bank (ADB), which is active in strengthening regional cooperation across the region. The Greater Mekong Subregion (GMS) Economic Cooperation Program, and the Central Asia Regional Economic Cooperation (CAREC) program, both supported by ADB, have identified several regional corridors. Other initiatives based primarily along maritime areas have also adopted regional corridors to promote their cooperation, such as the Indonesia, Malaysia, Thailand Growth Triangle.

While regional cooperation initiatives have clearly recognized development of regional corridors as central to enhancing their effectiveness and impact, the discussion of corridor development is often characterized by fairly general formulations that are frequently difficult to pin down in terms of content or implications. Starting from the unequivocal premise that these corridors encompass improved transport infrastructure and connectivity across the countries in the region, the regional corridors are then linked in general terms to increased trade and regional development. In the process, the corridors are expected to evolve into various stages through improvements in trade facilitation and provision of logistical services, but this transformative process is not informed by any explicit framework. The absence of a coherent framework is further intensified by the fact that regional corridor development intrinsically encompasses a broad spectrum of activities and stakeholders.

For instance, one approach to development of regional corridors envisages them as transforming through five stages, namely, Stage 1: Transport Corridor, Stage 2: Transport and Trade Facilitation Corridor, Stage 3: Logistics Corridor, Stage 4: Urban Development Corridor, and Stage 5: Economic Corridor. This taxonomy is a useful initial step but needs to be further developed. The differences between stages 2–5 is not clear-cut, in part because the stages in themselves are not all well defined. Further, although some overlap between the stages is envisioned, there is a clear sequencing imposed across the stages

[1] Examples include the Northern Corridor linking landlocked countries of East and Central Africa, namely: Burundi, Democratic Republic of Congo, Rwanda, and Uganda to the sea port of Mombasa in Kenya; the Walvis Bay Corridor linking the Port of Walvis Bay in South Africa to three neighboring countries of Angola, Botswana, and Namibia; and the Maputo Corridor between Mozambique and South Africa. See Adzibgey et al. (2007).

that is quite similar to the structural linearity of Rostovian "stages of growth" and may thus need further analysis.[2] The taxonomy also does not easily answer how the transition will take place across the various sequenced stages. Will the drivers be public investment, or will private investment lead the way? Will it be driven by foreign direct investments and trade? Is there room for small and medium enterprise (SME) development or will the transition be at the expense of SMEs, with large industrial enterprises in special economic zones and large logistics companies playing the dominant role? Even if several of these factors together provide the impetus, there still remain issues concerning pace and sequencing of specific categories of initiatives.

Regional corridors have been discussed extensively in urban planning and spatial organization of transportation, for example, in the form of growth poles or transport corridors.[3] Growth poles are centers of economic activities from which growth gets distributed spatially within a regional urban system, but this process is uneven, with the core benefiting first and the periphery becoming integrated only later. In the growth poles theory, transportation is a factor of accessibility that reinforces the importance of poles. In the context of regional urban planning, transport corridors are an accumulation of flows of services and infrastructures of various modes, and their development is linked to increased urbanization and urban development.[4]

The use of the term "regional" in urban planning is of course quite different from its meaning in regional cooperation due to the former being in a national context while the latter applies across sovereign states. This cross-border connotation leads to important differences in stakeholders, policy space, and institutional options for coordinating actions compared to subnational urban planning (Marrian 2001).[5] The direct relevance of regional corridors in urban planning is thus diluted when the context is regional cooperation across countries and cross-border regional corridors.

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2 Rostow's model of national development based on stages of growth became popular in the 1960s but was later characterized as being mechanical and historical (in the sense the end result is known at the outset) and thus not useful. For a basic discussion of the "stages-of-growth" model, see http://en.wikipedia.org/wiki/Rostovian_take-off_model.

3 See, for example, Rodrigue et al. (2009).

4 The concept of regional corridors is also utilized in other contexts such as environment management, and in movement of animals and spread of communicable diseases.

5 Corridors in urban planning are frequently likened to a major services duct that accommodates a number of different engineering services within the one channel; or a human arm containing veins and arteries, bones ("spines"), and elbow and hands ("nodes"). The corridors are connecting large activity nodes, traversing urban or interurban areas, and containing a high concentration of population and mixed land uses, such as shopping, social, cultural, and sporting facilities, and a large amount of residential accommodation. This implies a very different set of questions, institutions, and stakeholders than in regional (cooperation) corridors.

In the next two sections, this paper develops and elaborates a simple framework for assessing development of regional corridors in the context of regional cooperation.[6] The framework allows bringing together and analyzing links between various concepts of importance in regional cooperation such as (i) corridor development, (ii) trade and transport facilitation, (iii) measuring and monitoring performance of corridors, and (iv) logistics development. Analyzing such links highlights complementarities but also trade-offs across these categories that may need to be recognized in operational work in regional cooperation.

The framework for regional corridors development presented here is subsequently applied in Section IV to the GMS regional cooperation program, where corridor development remains a central guiding principle. The GMS program, a flagship regional cooperation initiative begun in 1992 and supported by ADB, is among the first proponents of the economic corridor approach to regional cooperation, having been adopted in its early years. Given the centrality of corridor development to the GMS program, the framework presented here has several important implications for the program going forward, as it moves into starting a third decade of regional cooperation.

Finally, in Section V, the framework for corridor development is used to discuss an appropriate methodology for monitoring performance of regional corridors and their development. There is increasing commitment of resources to improving transport and trade facilitation (TTF) along the GMS corridors—their "software"—and thus a growing demand to monitor the performance of the corridors in terms of trade facilitation. The proposed framework is useful in clarifying the need to ensure that the growing locus of TTF resources and activities does not lead to an unnecessarily narrow domain that may be characterized as "TTF for the sake of TTF". By embedding TTF within the broader context of corridors development, the framework can contribute to improving the operational context of TTF initiatives and to better prioritization of scarce resources.

II. Two Dimensions of Regional Corridors

The essential structural components of a regional corridor are its outer nodes or urban centers and the transport connectivity between them, along with other smaller nodes that may exist in between and the land surrounding the corridor in its vicinity. For corridors to be viable, they must make economic sense through encompassing actual or potential economic growth, which requires at the least that the nodes linked by the corridor are substantive centers of economic activity. Corridor development does not create economic strength so much as it channels, focuses, and amplifies the potential for economic growth. Thus, a corridor from "nowhere to nowhere through nowhere" would not be very

[6] Subsequent references to "regional corridors" will refer not to urban planning but to corridors in the context of regional cooperation across sovereign states.

meaningful. Similarly, a corridor linking two substantive nodes but with no potential for growth in between (because of adverse geography such as extremely rugged terrain or desert) is also of limited interest, as is a maritime "corridor" linking two ports.

This is particularly true when we think in terms of a corridor development approach to regional cooperation. The corridor development approach can be described as using transport corridors to provide a backbone or spatial focus for regional cooperation projects and activities, clustering them along corridors or at nodal centers on the corridors. This is expected to help develop surrounding areas, including through catalyzing other investment from within and outside the region. The spatial focus can also facilitate prioritization of regional projects, and coordination of national projects among neighboring countries. The corridor development approach is thus a very practical response to maximizing the impact of typically limited resources available for regional projects.

In this section, the two building blocks of a basic framework for regional corridor development are analyzed, namely, the extent to which the corridors are national or regional, and the extent to which they are narrow or broad. This allows a more detailed elaboration of various aspects of corridor development in the next section, including considerations of sequencing over time.

A. National versus Regional Corridor

What constitutes a regional project as distinct from a national one? This is of course a central question in regional cooperation. Conceptually, regional projects would comprise projects that embody cross-border spillovers (positive or negative externalities), which may then require joint or coordinated actions by two or more countries. Good examples of these are pure regional goods such as sustainable use of shared natural resources, controlling regional communicable diseases, air pollution, and cross-border crimes such as trafficking, etc. While "regional" aspects of public goods are relatively straightforward to identify, this does not translate as widely in the context of infrastructure projects such as roads.[7] There are examples in energy infrastructure, such as production of hydropower in one country for sale to another country, but this may be independent of any externalities.[8] The regional dimension of transport projects, which are the focus here, is even more nuanced.

For infrastructure projects, the operational definition used by ADB is wider, going beyond joint (or even coordinated) projects across countries, or projects with cross-border externalities, to also include "national projects with regional implications", such as a

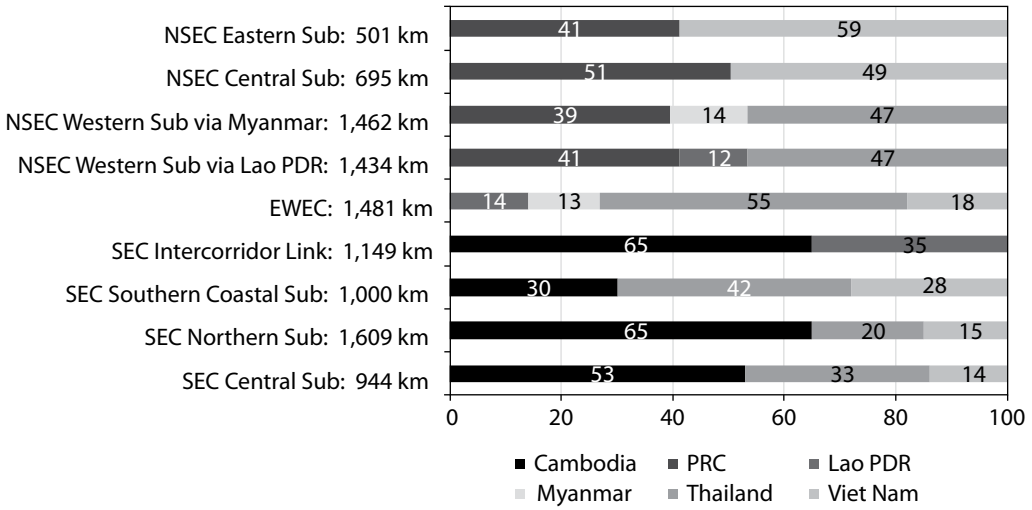
[7] Theoretical examples can be easily constructed of cross-border spillovers of costs or benefits for road projects, but their practical relevance is limited.

[8] However, there may be cross-border externalities due to environmental impact of large hydropower projects.

national transport system that is part of a regional transport system, or a national power grid within a regional power grid.[9]

Indeed, the most common category of regional infrastructure projects in ADB operations are "national projects with regional implications". This definition of regional projects is not only operationally relevant (albeit difficult to standardize in practice), but also useful conceptually because it explicitly recognizes the intrinsic duality of many infrastructure projects, specifically transport corridors, as *both a national entity as well as a regional one*.

Figure 1: Intercountry Distribution of GMS Corridors (percent)



EWEC = East-West Economic Corridor; GMS = Greater Mekong Subregion; km = kilometers; NSEC = North-South Economic Corridor; PRC = People's Republic of China; SEC = Southern Economic Corridor; sub = subcorridor.
Note: The horizontal axis represents the estimated country-wise length of GMS corridors as a percentage of the total.
Sources: ADB (2010a, 2010b, 2010c); ADB staff estimates.

This duality is quite apt for transportation infrastructure. To illustrate, Figure 1 provides summary data on the three GMS corridors, in terms of the fraction of total length of their subcorridors lying within specific countries. For each corridor/subcorridor, it is evident that the corridor lies substantially within a particular country. For example, 53% of the central subcorridor of the Southern Economic Corridor (SEC) lies within Cambodia, while 65% of the northern subcorridor of the SEC is also within Cambodia. Similarly, 55% of the East West Economic Corridor (EWEC) is accounted for by Thailand, which also accounts for 33% of the central subcorridor of the SEC. Given that the corridors are almost 1,000

[9] The ADB Operations Manual Section B1/BP (2010) defines regional projects as also including other categories such as those that (i) facilitate regional policy dialogue that leads to regional agreements promoting trade, investment, and monetary and financial cooperation; (ii) support research and knowledge generation on issues related to the four pillars of the regional cooperation and integration strategy, and promote knowledge sharing and dissemination among the ADB's developing member countries; and (iii) support initiatives or strengthen the institutional capacity of regional groupings, such as the Association of Southeast Asian Nations, GMS, CAREC, etc.

kilometers or more, these are substantial stretches within a specific country. From the perspective of that country, it would be strange to not consider the corridor as a national corridor. This is particularly true if the corridor represents a major route within the country, as is true for example, for the central subcorridor of the SEC in Cambodia. Nonetheless, it would be equally valid to consider the substantive stretch of the SEC in Cambodia as also comprising part of a regional corridor.

The intrinsic national/regional duality of these corridors implies that the same national corridor can have an increasing regional aspect to the extent it reaches across borders. The latter would entail the nodes of the corridor being across national borders and having economic attraction to each other through mutual demand for factors of production and/or goods. Increased regionality would also depend upon the ease with which factors and goods can cross borders.

B. Narrow versus Broad Corridor

A corridor starts with the physical connectivity, a road or a highway connecting two or more nodes. It is natural to view the corridor as the means of transport connectivity, namely, the highway. This view is useful and practical, but narrow relative to the view that a corridor comprises not only the highway per se but also the areas around the highway that use it. The relationship between development of connectivity and of areas or zones around the connecting infrastructure is not always one way in terms of causality—demand for connectivity may arise due to developed areas already in existence, while connectivity may lead to new or further development.

The concepts of narrow and broad corridors are depicted in Figure 2 below, where Y and Z denote two nodes or end-points connected by a highway.

Figure 2: Narrow versus Broad Corridors

Source: Author's representation.

The narrowly defined corridor is the "dumb-bell" comprising Y and Z, and the significance of the middle (highway/corridor) is simply that it connects Y and Z. However, consider now the points A and B lying off the highway at distance of A and B, respectively. Let C_A represent the cost of moving from A to the highway, and let C_B represent the same

for B. Presumably, C_A (C_B) depends upon the distance between A and the highway, the road conditions that will determine the fuel costs and costs of wear and tear as well as the speed or time to travel, the availability of transport vehicles appropriate for the road conditions, and other factors such as the extent of decentralization and local taxes/ surcharges.

The choice of moving from A to B lies between going directly across versus going to the highway from A, traveling along the highway, and then getting off to reach B. If the cost of directly going from A to B is C_{AB} and the cost of traveling on the highway is C_H, then it is better to go from A to B via the highway if

$$C_A + C_B + C_H \leq C_{AB} \quad (1)$$

All points off the highway like A and B that satisfy the relationship above can also be deemed as part of the corridor, which would then constitute a broader view of the corridor than the dumb-bell connecting X and Y.

The representation above is at the most basic level necessary for the present purposes. More complexity can be brought in to incorporate other features. For example, the end points/nodes A and B may be represented more realistically as larger, concentric rings of urbanization with the corridor opening up into a funnel shape as it comes closer to each. Similarly, existence of another node near or in-between A and B, or of other corridors in the vicinity, is also abstracted from for purpose of simplicity in illustration.

To formalize the discussion above, let the distance between A and B along the highway be denoted by D, and let D also be the distance between A and B if traveling directly, without using the highway. Let C_H, the cost along the highway, be proportional to D, i.e.,

$$C_H = \theta(w).\ D \quad (2)$$

where $w = (w_i,\ i = 1,2,\ldots)$ denotes various determinants of θ and thus the cost of transport along the highway, such as road quality, road congestion, and other such factors.

Similarly, the cost of traveling from A to the highway can also be written as proportional to the distance traveled (to the highway), denoted as δ.

$$C_A = \lambda(w).\ \delta \quad (3)$$

where w again denotes factors determining the cost. We can also assume without any loss that the distance and cost of transport from B to the highway is the same as that for A, i.e, $C_B = C_A = \lambda(w).\ \delta$.

Finally, let φ(v).D be the cost for traveling directly from A to B without using the highway (C_{AB}), where the factors determining costs of transport, v, are assumed for simplicity to be distinct from those in w. Since the highway has lower costs of transportation, by definition φ> θ.

For the highway to be preferred in use, equation (1) above can be rewritten as

$2\,\lambda(w).\,\delta + \theta(w).\,D \leq \varphi(v).D$, and if δ^* is the value that results in equality then

$$\delta^*(w,D;\,v) = [\varphi(v) - \theta(w)].\,D/\,2\,\lambda(w) \qquad (4)$$

where δ^* is the distance off the highway that defines the limit of areas that are integral users of the corridor's connectivity. *It can thus be interpreted as the (one-sided) width of the transport corridor* given the nodes A and B.

Equation (4) provides straightforward and intuitive relationships between the corridor width and the parameters w and D, namely,[10]

(i) $\partial\delta^*/\partial D > 0$, or the width of the corridor is positively related to the distance between A and B. The greater the distance necessary to be traveled on the (lower cost) highway, the more worthwhile it is for farther points to use it despite having to travel extra to reach the corridor;

(ii) $\partial\delta^*/\partial w_j > 0$ if $\partial\theta(w)/\partial w_j < 0$, implying increase in any parameter w_j that reduces costs of transport on the corridor will widen the corridor; and conversely,

(iii) $\partial\delta^*/\partial w_k > 0$ if $\partial\theta(w)/\partial w_k < 0$, implying a factor w_k results in a narrower corridor if its increase results in higher costs along the corridor.

Thus, if there is an increase in stoppages for toll charges of various kinds along the highway, the width of the corridor will be decreased, while investment in upgrading the highway will imply a widening of the corridor.

We can also look at situations where a factor affects costs on the corridor but not on the link from A (or B) to the corridor, and vice versa, i.e.,

(iv) A factor k such that $\partial\theta(w)/\partial w_k \neq 0$ while $\partial\lambda(w)/\partial w_k = 0$. Thus, factor k affects costs on the highway corridor but not between points A or B and the corridor. This will result in widening (narrowing) of the corridor if the effect on θ is inverse. For example, introducing trade facilitation measures to

[10] From total differentiation of (2), $\partial\delta^*/\partial w_j = -(\theta' + 2\delta^*\lambda')/2\,\lambda$, where θ' and λ' are derivatives with respect to w_j. θ' and λ' have the same sign (unless one of them is zero), implying $\partial\delta^*/\partial w_j < (>)\ 0$ if θ' and λ' > (<) 0.

lower costs on the highway will increase corridor width, even though costs of traveling from A (or B) to the corridor are unaffected.

(v) Conversely, consider a factor j such that $\partial\theta(w)/\partial w_j = 0$ while $\partial\lambda(w)/\partial w_j \neq 0$. This represents a factor that affects costs of transportation from A (or B) to the corridor, but not costs along the corridor. For example, a rural roads project that reduces costs of linking points like A and B to the highway without affecting costs on the highway itself. This again would result in widening of the corridor.

Finally, note that the analysis of corridor width above applies specifically to the stretch between points A and B. Outside that range, the corridor would not have any width, unless there are other such points. This would imply that greater presence or density of points like A and B—essentially urban or semi-urban nodes off the corridor—would also contribute to widening of the corridor.[11]

These relationships can be used to consider various determinants of costs of transportation as shown in Table 1 below, which shows the impact of specific factors and types of regional projects on development of the corridor.

Table 1: Corridor Effect of Selected Factors/Projects

Factor/Project	Relationship to		Corridor Effect
	θ (direct)	λ (indirect)	
Highway/corridor upgrading	Inverse	Inverse	Widening
Road safety improvement	Inverse	Inverse	Widening
Increased costs at borders	Inverse	Nil	Narrowing
Increased transport costs due to lack of sector competitiveness	Inverse	Inverse	Narrowing
Logistics development	Inverse	Inverse	Widening
Rural road improvement	Nil	Inverse	Widening
Corridor town development	Nil	Nil	Widening*
Value chain and SME development	Nil	Nil	Widening*
Tourism infrastructure	Nil	Inverse	Widening*

SME = small and medium enterprise.

* Corridor widening impacts either by bringing into existence more nodes off the corridor (points such as A or B), or by developing the existing ones. Improved tourism infrastructure in assets off the corridors may lead to corridor widening through improved secondary roads and also through increased nodes off the corridor (even if secondary road improvement is not included in tourism infrastructure). SME development and integration of such firms into value chains will also increase density of off-corridor nodes, thus leading to corridor widening.

Source: Author's representation.

[11] The simplified formalization here does not address the issues of corridor congestion and demand or benefits of traveling from A to B. Presumably, at initial stages of corridor development, congestion would not be a significant constraint, and can thus be ignored. Expanding the analysis to bring in the benefits of traveling can be done but is beyond the scope of the immediate analysis.

Projects such as creating 2–4-lane highways or reduction of highway hazards would lead to corridor widening through reduced transportation costs. Increased competitiveness of the transport sector, often characterized by monopolistic practices and other distortions, is another cost-reducing factor that can contribute to corridor widening. Improved logistics similarly can lead to corridor widening by reducing transport costs along major routes.

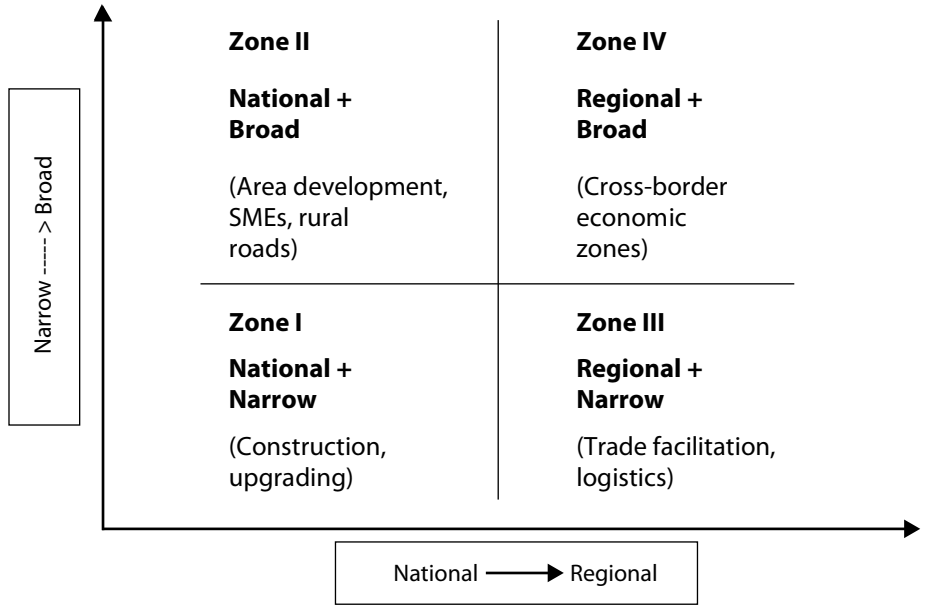
III. A Framework for Corridor Development

The two dimensions of corridors in the previous section—national/regional and narrow/broad—provide a useful framework to assess the components for development of corridors and their interrelations. The framework is presented in Figure 3 below, where the x-axis shows the national/regional characterization of corridor, representing increased regionality of the corridor as one moves to the right, and the y-axis represents the narrow/broad dimension, with increased widening of the corridor moving up the axis. Together these two dimensions divide into four quadrants or zones.

Zone I, representing the national and narrow stage of the corridor, is a useful starting point, marked by the corridor or highway's initial construction, or by upgrading of existing (lower-quality) roads. This phase is obviously intensive in infrastructure investments, and by the nature of such investments, can last over several years.

In terms of sequencing, Zone II (National, Broad) and Zone III (Regional, Narrow) are interchangeable (i.e., either or both may be pursued at any time), but the two are quite distinct in content. In particular, the locus of actions for promoting Zone II development lies primarily within national governments (discussed further in the next section), while Zone III development requires regional cooperation. Another substantive difference between the two zones relates to the level of investments required. Zone III is relatively "investment-light", with the focus being on strengthening and developing the software for the physical infrastructure already in place, while Zone II is "investment-intensive" due to the continued need for developing diverse infrastructure.

Figure 3: Four Zones of Regional Corridors Development



Source: Author's representation.

For Zone II, as noted previously, there are several initiatives that may be undertaken for widening the corridor. These include activities that may broadly be termed "area development plans" through a variety of methods such as urbanization, improving urban infrastructure, promoting industrial development, enhancing business climate and capacities for SMEs, and investing in tourism infrastructure. Within the national context, approaches promoting integrated rural development for corridor-linked rural areas are another example of Zone II development of corridors. Other initiatives such as developing secondary or rural roads that link to the corridors, improving road safety, and enhancing competition in the transport sector would also contribute to corridor widening. While the interventions above refer to role of the public sector, clearly substantial private investment would need to complement the public sector. This will require government policies that encourage crowding in of private investment, and also utilize public–private partnership as appropriate.

Zone III is the transformation of the (narrow) national into a regional corridor through extension beyond national boundaries. This may take the form of linking national corridors, but is more usefully viewed as the subsequent stage of diminishing the height and density of the barriers at national boundaries through increasing trade, combined with enhanced transport and trade facilitation. The focus of the "narrow" corridor is on moving goods and people at fast speed and least cost from "point to point". The "points" are usually urban centers, which may now be in more than one country along the corridor. These centers may be dominated by manufacturing and, within manufacturing,

by large and medium enterprises. Areas between the centers do not have high priority. Consequently, there is less focus on SME development, which typically is common in the rural or semi-urban areas between the centers served by the regional corridor. Enhancing the regionality of narrow corridors may also be supported by developing and strengthening the larger logistics companies,[12] and by improving vehicles and standardization of procedures on the corridor. The private sector again has a critical role in Zone III development, particularly in the strengthening of the logistics sector that can reduce the costs and increase the flow of internodal exchange of goods and services across the corridor. The private sector also has to take the lead in enhancing transport and trade facilitation as the lead stakeholder.

Finally, Zone IV marks the last stage of corridor development, wherein the transformation of the corridor from a narrow, national entity into a broad and seamless regional entity is completed. This is an advanced stage that is neither inevitable, nor easy to achieve in the short run. Movement toward Zone IV corridors may require joint regional plans, or joint plans for cross-border area development by the concerned countries or, at the least, coordination of national plans. Clearly, the former option is not trivial, and may not be feasible for a long time if it will need mechanisms for fiscal or other transfers to be effective. The alternative, of coordinating national plans (including private-sector investment and activities) is a more viable option.

This framework is relatively static in the sense it does not delve into issues of sequencing and dynamics within a specific zone. Yet there is a sequence across the four zones, with Zone I clearly preceding Zones II and III, which in turn are necessary as prerequisites for Zone IV development. Successful implementation of Zone II and Zone III is not only chronologically prior, but the quality of Zone II and III implementation will also fundamentally affect the quality of Zone IV development and growth.

IV. Implications for the GMS Program

The GMS program is a flagship regional cooperation initiative of the ADB, started in 1992. It includes Cambodia, People's Democratic Republic of Lao (Lao PDR), Myanmar, Thailand, Viet Nam and two provinces of the People's Republic of China (PRC), Yunnan Province and Guangxi Zhuang Autonomous Region.[13] Three regional corridors have been promoted in the GMS program: (i) the East–West Economic Corridor (EWEC), the only direct and continuous land route between the Andaman Sea and the South China Sea; (ii) the North–South Economic Corridor (NSEC) with three subcorridors, namely, Kunming to Bangkok via the Lao PDR or Myanmar; Kunming to Ha Noi and on to Hai Phong, and

[12] Logistics development in principle can be within Zone I also, if there is adequate demand for value chains within the domestic economy.

[13] See http://www.adb.org/gms/ for more details on the GMS program.

Nanning to Ha Noi; and (iii) the Southern Economic Corridor (SEC), which includes three subcorridors including the route linking Bangkok to Phnom Penh to Ho Chi Minh City.

The GMS program adopted the economic corridor approach to regional development in 1998, and has anchored regional projects and initiatives on these corridors. Continuing its emphasis on development of the regional corridors, the GMS countries established the Economic Corridor Forum (ECF) in Kunming, PRC, in June 2008. The ECF is a ministerial-level multisector platform for coordination, networking, and facilitating initiatives to develop the GMS corridors.

With almost $12 billion worth of investment projects completed or under implementation, and entering its third decade, the GMS program is one of the more advanced regional cooperation initiatives. Given the centrality of corridor development in GMS cooperation, the simple framework presented here has some direct implications for the GMS program.

(i) **National/regional dichotomy has little relevance to the GMS program**. A clear implication of the framework presented here is the rejection of the strict national/regional dichotomy for corridor development. The logic for rejecting explicit regional/national dichotomy in the context of GMS corridors is reinforced when second-generation projects are examined: once the larger national/regional corridors are already in place, the forced dichotomy of national versus regional project becomes further diluted. A project linking other parts of the country (urban or semi-urban) to the regional corridor is legitimately as much a regional project as it is national. As shown in Table 1, a wide variety of projects have direct impact on regional corridors, through either increasing their regional characteristic or widening their area of influence. In this sense, a criterion for relevance of national/regional dichotomy may be the extent to which the early, national projects (Zone I) have been completed.

Thus, it is necessary in the GMS context to reject the strict national versus regional dichotomy, which is administratively useful but conceptually less rewarding, particularly for second-generation regional projects. In an advanced regional cooperation program like GMS, very often *regional is national and national is regional*. In terms of the operational definition used by ADB for defining regional projects as “national projects with regional implications”, it may be argued that for a program like GMS with second-generation projects, one should go further and look instead at “regional projects with national implications”.[14] The difference is more than semantics, and is particularly relevant in the context of subsequent transition from Zone II toward Zone IV corridor development. The genesis and rationale of “national projects with regional implications” is national wherein the regionality is an addendum or a side benefit. In contrast, “regional

[14] Or more strictly, “projects regional in scope but national in implementation”. This is just another way of phrasing the oft quoted maxim, “Think regionally, act nationally”.

projects with national implication" have to be justified in a regional framework and logic, constrained by the requirement to meet adequate national development criteria.[15]

A good example of a mechanism in which this approach is operating may be the Mekong River Commission (MRC), an intergovernmental body whose program is intended to be "regional", covering the countries and areas sharing the Mekong River and whose projects are "regional with national implications". Despite some issues facing the MRC on the use of the Mekong River, it has a clear regional framework and mandate anchored on the Mekong River. In a sense, the members have defined the Mekong Basin as a regional entity for which planning and execution of (national) projects are envisioned to be coordinated by and through the MRC.

(ii) **The GMS program needs to transition into second generation**. For much of the first phase of the GMS program comprising the 2 decades since its inception in 1992, the program has remained anchored on Zone I. Of the total investments made under the GMS program ($11.8 billion as of end-2010), more than 90% has gone into construction and/or upgrading of highways related to the three GMS corridors. The GMS corridors are not yet completed, with some segments yet to be developed. Nonetheless, the overwhelming proportion of Zone I development of GMS corridors is in the advanced stage of completion.

(iii) **The second generation will comprise Zone II and Zone III development**. Given that the GMS program has to transition into other zones, the question is which zone(s), and in what sequence?[16] As already noted, Zone II and III can be sequentially concomitant while Zone IV is operationally meaningful only at a subsequent stage of regional development and cooperation in the GMS. The movement to Zones II and/or III has to be the next stage of the GMS, constituting the second-generation of regional cooperation initiatives in GMS.

(iv) **Zone III activities are increasingly integrated into the GMS program**. Reflecting the need for transition, there has been a clear and growing shift in the GMS program toward Zone III activities for development of the corridors. Transport and trade facilitation (Zone III) has been recognized as a high priority in recent years, and in 2010, the GMS countries agreed upon an Action Plan for Transport and Trade Facilitation. Development of logistics and freight forwarding

[15] Put differently, the difference between "national project with regional implications" and "regional project with national implications" is not in the implementation, which in both cases is national, but in the objective function being maximized and the constraints. In one case, the objective would be to maximize national target (GDP or welfare) subject to a minimum benefit to regional countries. The alternative would be to maximize a regional target subject to minimum benefit to the country implementing the project.

[16] The analysis here excludes another option, namely, to start other corridors, including railways. Development of railway corridors will likely grow over time, but the focus here is on development of existing regional corridors.

services is also growing in priority. It is expected that these areas will be the center of considerable resources and efforts on the part of GMS stakeholders in the medium term. Several development partners have also embraced the enhancement of Zone III initiatives since these are consistent with requirements of the Association of Southeast Asian Nations Economic Community, and are also "investment-light". Transport and trade facilitation issues are admittedly complex, requiring institutional changes and capacity building, but are relatively less resource-intensive since no major investments are necessary in infrastructure. Some investments may be required for equipment, border facilities, laboratories, etc. but the scale is modest compared to investments needed for developing or improving physical infrastructure.

(v) **Zone II development remains low key, reflecting complexity and resource constraints**. Unlike Zone III however, the shift into Zone II development is not as pronounced yet, although a few projects and initiatives are under preparation (such as rural roads project in Cambodia and a project on development of towns along corridors). The framework above suggests there is a need to greatly increase the resources and projects for Zone II development of the GMS corridors. Why is the shift toward Zone II not as pronounced? One possibility may be the fact that Zone III transition is less resource-intensive being "investment-light", while Zone II needs substantially more investment of resources. It is also possible that Zone II development is even more difficult (than Zone III) in terms of conceptualizing and implementing projects. For example, development of rural roads, even if linking to regional corridors, often faces difficulty within national programs due to constraints of unfavorable commercial cost–benefit ratios. To mitigate these, it may be necessary to package the roads with other infrastructure investments to increase not only the link to markets through rural roads, but also capacity and skills for producing for the markets. Developing and implementing such integrated rural development projects is inherently more complex than just building roads, and has often proved difficult in the past. However a generation spent in Zone I should not make it into a "comfort zone" for the GMS program, leading to inertia toward the complexity and different challenges of the investment-intensive Zone II.

(vi) **Greater integration of Zone II in GMS program is a necessity**. Notwithstanding the difficulties, the challenges of Zone II actually are opportunities for the next stage of GMS corridor development. A shift toward investment-light Zone III alone would not be sufficient for the GMS program, and would actually intensify the pangs of the needed generational transition. The success of the GMS program in its first generation in Zone I has been defined by its essential characteristic as *an investment-driven vehicle around which the member countries have coalesced to cooperate on other issues*. Thus, a transition to Zone III minus Zone II risks draining the GMS program of its well-earned gravitas and the key ingredient to its

success. It may also lead to growth that would be geographically imbalanced and less inclusive than desired.

(vii) **Zone II transition should be anchored on a regional master plan.** The GMS countries straddle a dynamic region between large and fast-growing economies in East and South Asia, and it is easy to project economic activity of several trillions of dollars in the expanded region within the next decades. Growth nodes of today may be surpassed by new centers catering to the increasing trade flows accompanying the high levels of economic activity. This is a good time to do a regional master plan for the GMS subregion based on current trends and medium-term forecasts in regional economic activity, including trade and urban development. The regional master plan can ensure that increased channeling of resources in Zone II development is also based on good cost–benefit analysis from the start. The regional master plan can also serve as the launch pad for discussing higher-level cooperation in the GMS program in its third decade, including increased regional cross-border investments.

The regional plan can and should incorporate issues that are increasingly and repeatedly being emphasized by the GMS member countries as critical going forward, namely, environment and climate change. This recognizes that Zone II development of corridors has to use them and build on them, and also sustain them over the long run. If we view Zone II development as enhancing or preserving the natural infrastructure along the corridors, then Zone II would be comparable to Zone I, (with the difference being replacement of "physical" by "natural" infrastructure).[17] The GMS countries are quite vulnerable to climate change and the natural infrastructure of these countries is under great stress. Embedding the framework for Zone II development within climate change and environment management also has the benefit of encompassing several initiatives already under implementation among GMS countries with the same underlying motivation (i.e., sustainable development) under the rubric of disaster risk reduction, natural resource management, and climate change adaptation/ mitigation. At the same time, the regionality of environment and climate change approach is quite obvious.

(viii) **Economic Corridors Forum may provide the seeds of Zone IV regional corridors development**. The Economic Corridors Forum (ECF), which has already met twice and is seeking a well-defined role within the overall GMS framework, should be developed as the nascent platform for Zone IV development over the longer term. In the short term, the ECF should focus on coordinating Zone III initiatives (it has focused on transport and trade facilitation to date, and that should continue), but it should also incorporate within its active ambit Zone

[17] It would also provide an apt development role for GMS development partners, including ADB, given the relative ease of financing hardware infrastructure today compared to 2 decades ago; at the same time, resources for enhancing natural infrastructure are more difficult to mobilize.

II development of the GMS regional corridors. The development of the regional master plan and monitoring its implementation and its updating could be added projects of the ECF in the short term.

V. Monitoring Corridor Performance

In view of the large resources already invested in the GMS corridors, there is a need to monitor their performance. This need is further underlined by the increased shift toward strengthening the intangible "software" of the corridors. Sporadic attempts have been made in recent years to measure transport costs along the GMS corridors, using the time/cost distance method (TCD) of the United Nations Economic and Social Commission for Asia and the Pacific,[18] and at selected border sites on the corridors, the time-release surveys based on the World Customs Organization methodology. The CAREC regional program has already instituted a system to generate quarterly indicators based on the TCD, with the data being generated in collaboration with associations of freight forwarders and road associations. This section addresses the question: what is the appropriate methodology to monitor corridor performance for GMS corridors? The question is motivated by the fact that it is not advisable to take "off-the-shelf" the approach developed in CAREC and apply it to the GMS for two sets of reasons: there are significant differences between CAREC and GMS corridors, and the framework developed earlier indicates there are several aspects to corridor development and performance, and the time/cost distance and time-release surveys cover only a small component of these. Both sets of issues are considered below.

A. Differing Contexts of CAREC and GMS

A major difference in the context of the CAREC and GMS corridors is that the GMS corridors account for a much smaller proportion of trade than the CAREC corridors connecting landlocked countries. GMS has a long sea coast and a lot of the trade is moved over short sea distances, e.g., Viet Nam coal to the PRC. Unlike CAREC, GMS also has a substantial number of navigable rivers and coastal and river ports. The GMS rivers are active commerce corridors that exist in parallel to road corridors. Finally, many CAREC countries aim to be transit countries between Asia and Europe. This is generally not the case in GMS, though Myanmar may be quite effective for the PRC to reach the Indian Ocean, while Viet Nam can be a transit country for Cambodian exports; the Lao PDR is landlocked, needing exports and imports to transit through neighboring countries. At the level of software and institutions, the shared history of CAREC countries as part of the former Soviet Union implies greater prevalence of a common language, and similarity in institutional frameworks, laws, and regulations related to transport.

[18] The methodology relies on cost and time characteristics of every section along a transit route to identify the location and size of inefficiencies and bottlenecks.

B. Corridor Development and Corridor Monitoring

Monitoring corridor performance through the time/distance cost methodology or time release surveys implicitly incorporates a narrow view of the corridor, namely, the specific transport route connecting two specified points. On the other hand, the concept of corridor when discussing corridor development is broader. Emphasizing measures of one kind at the expense of the other would provide an incomplete and unbalanced view since some measures to develop a corridor broadly may complement development of the narrowly defined corridor, but others may entail a tradeoff. It is important therefore to contextualize and firmly anchor corridor performance monitoring on development and growth, which can be aided by using the framework provided earlier. This would suggest using indicators for corridor development and performance that reflect all the zones, or at least Zones I to III.

Consider first the border trading costs as measured by time release surveys. These are important indicators of Zone III development of the corridor, and thus a very useful indicator of attempts at transport and trade facilitation, which is a growing area of emphasis in the GMS program. Yet, it is also important to underline that *trade facilitation has to begin with trade*. This means trade facilitation, as measured by costs of transactions at the border, has to take due cognizance of actual trade flows (including informal trade if the latter is a significant activity, as suggested by anecdotal evidence for some GMS countries with relatively porous borders). Put differently, measures of trade facilitation at the borders should be trade-weighted, reflecting the quantitative trade flowing through that border. For example, high costs at a border crossing point where there is virtually no flow of traded goods, combined with lower border costs at points with high trade flows, would be quite different at an aggregated level if compared to the converse situation where border costs are high at points with large trade volume and low elsewhere. This is relevant given the relatively low share of GMS corridors in national trade volumes.

Internal trade is another issue relevant to corridor performance monitoring. Measuring performance through border costs alone can miss out on an important role of the corridor, even narrowly defined, in promoting economic growth. Imagine a corridor that is 60% within one country, with the remaining 40% divided into neighboring countries. To focus only on cross-border trade activities, either bilateral or transit, implies ignoring the relevance of much of the 60% that may be effectively catering to domestic trade and development. In the extreme case, one can consider a case of extremely high border trading costs that prevent almost any cross-border trade from occurring, but a hugely dynamic internal trade catering to domestic demand. Performance monitoring based on border costs alone would provide a misleading assessment of the corridor.

Finally, internal costs of transport may not necessarily be heavy on transaction costs at the borders, but more on the logistics costs (other than border costs). So poorly

developed infrastructure, poor policies that allow monopolistic profits, corruption, and lax enforcement can lead to deterrence of total trade and poor corridor performance, even if border costs are relatively low.

The TCD methodology for monitoring corridor performance avoids some of these problems since it encompasses a view of the entire corridor. However, it is constrained by its narrow view of the corridor, which focuses on the time and resource costs of moving goods between any two points with little to say about development of the corridor through its widening. Both border costs indicators and time/cost distance indicators are useful indicators, but only of Zone III corridor development. They need to be supplemented by Zone I and II indicators, and also informed by the context of the corridors (as discussed in Section VA above).

C. Indicators for Monitoring GMS Corridors

It is evident from the discussion that indicators of trade facilitation in GMS may not be very meaningful in a broad sense, given the relatively low trade weight of corridors in the GMS countries. Neither can the transport and trade facilitation indicators be considered as sufficient for monitoring corridor performance. At the same time, these indicators are clearly necessary inputs and can be relatively easily implemented. The approach adopted in CAREC, whereby partnership with freight and transporters' association is designed to collect such data, is a useful starting point, though needed capacity building may be somewhat greater in the GMS context. The system to collect data should work with both national and local carrier associations and logistics associations, using them to recruit small, medium, and large carriers and logistics operators.

Use of time/cost distance methodology for indicators of transport and trade facilitation should explicitly incorporate the quality of trade, particularly asymmetry in trade flows. Activities thus should be on a round-trip basis, to take into account the cost of empty repositioning (i.e., returning empty equipment home or moving a piece of empty equipment to another location where a load can then be secured). Similarly, quantification of exchange of traffic rights needs to look at both the utilization rate by respective countries, as well as country benefits from the exchange (e.g., are vehicles using exchange of traffic rights based in the country but owned by another country). The measurements of time/distance costs should also address heterogeneity in trading environment by considering truckload, less than truckload, container load, and wagon load shipments. Attempts should be made to cover road, rail, water and road/water and road/rail movements of goods. This will also provide useful inputs ahead on issues related to interface between different modes. Table 2 provides a summary of zone-related indicators for corridor development.

Table 2: Indicators for Monitoring Corridor Performance by Zones

Zone	Indicator
I (Narrow, National)	• Percent of corridor completed (to specified standards, divided, number of lanes, etc,) • Time/cost distance within borders • Indicators of national logistics development (number of transport and logistics companies, others)
II (Broad, National)	• Volume of domestic passenger and cargo traffic • Corridor width (traffic volume on feeder roads) • Tourist arrivals by land, tourist spending, tourist nights • Number of accommodation facilities along corridor • Approved/registered investments in corridor provinces • Approved/registered foreign direct investment in corridor provinces • Integration and use of multimodal transport for cargo
III (Narrow, Regional)	• Percent of total trade accounted for by corridor • Growth in value of cross-border trade at main border checkpoints • Volume of traffic at border checkpoints • Trade facilitation measures (time/cost distance, and time release studies) • Volume of foreign vehicles traveling within country

Source: Author's representation.

VI. Conclusions

Development of regional corridors is an essential component of the regional cooperation toolkit. This paper elaborated on a framework for regional corridor development on the basis of two essential aspects of these corridors, namely, the extent of their regionality and their area of influence or width. These two dimensions of regional corridors led to a framework identifying four zones of corridor development, along with associated interzone sequencing.

The framework was applied to the GMS program, with several implications emerging. A key implication is that an advanced program like the GMS now needs to redefine regional projects differently since the national/regional dichotomy is less relevant to the program. The program needs to transition out of the first development zone into Zone II and Zone III development. In particular, the program needs to balance its thrust into investment-light Zone III, which is already under way, with a greater emphasis on investment-heavy Zone II. This may require developing a medium-term regional master plan. The plan can also address the issue of defining regional projects for the GMS program by identifying an associated pipeline of investment projects.

The framework developed in the paper is preliminary and can be extended and deepened in several ways. The formal analysis does not explicitly address the issues of additional nodes and congestion, nor does it incorporate benefits (of using corridors), which may make it a richer optimizing framework. Another useful extension would be to look at links

between Zone II and Zone III developments that benefit both types of development. Empirical application of the framework to corridors, including implementing the corridor performance indicators, is another area that will be useful in future work. A rich set of indicators can allow comparison of corridors and linkages to policies and stakeholder actions—public and private—to assess better interventions for development of the regional corridors.

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About the Paper

Although regional corridors are popular components of regional cooperation initiatives, discussion about their development tends to be relatively general in scope and difficult to pin down in terms of content and implications. Pradeep Srivastava elaborates on a simple analytical framework for regional corridors development anchored on the extent to which they are national or regional, and the area of their utilization. The framework is subsequently applied to the Greater Mekong Subregion regional cooperation program.

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