# The Concept, Evolution, Impacts and Critical Success Factors of Regional Economic Corridors

Aggarwal, Aradhna

Copenhagen Business School, Frederiksberg, Copenhagen

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# The Concept, Evolution, Impacts and Critical Success Factors of Regional Economic Corridors[1]

Aradhna Aggarwal[2]

**Abstract.** With globalisation gathering momentum in the early 2000s, economic corridors also gained tremendous traction as a policy tool of economic and social development in the developing countries. A variety of new corridors have sprung up ranging in geographic scope- from local to national to cross border regional to mega transnational corridors forming land bridges for countries across different regions. This paper reviews the current knowledge on economic corridors. The focus is on regional economic corridors. It concludes that a deep understanding of economic corridors as a development tool, finding common grounds, and building mutual trust between stakeholders both within and across borders are critical for the success of regional economic corridors.

**Key words:** Regional economic corridors, Conceptual framework, Evolution, Critical success factors, benefits and costs.

**JEL :** F55,F15, F02,O2, O18

## I. BACKGROUND

The history of economic corridors can be traced back to at least 4000BC when they first emerged in the form of trade routes. Trans-Saharan trade routes across the Wadi Hammamat from the Nile to the Red Sea are the first recorded trade corridors (Hope and Cox 2015). Later Hammamat became a part of the Silk Route which was an interconnected series of trade routes spread over five thousand miles connecting the East to the West through regions of Asia and the Mediterranean Sea (Continental) and made a significant contribution to the development of the countries along its routes. Over time, the Silk Road began to lose its importance due to geographical discoveries of new trade routes and transport revolution which led to a web of trade corridors across the world[3]. According to Feng (2005) "trade routes or corridors as they have come to be called in recent years have been as old as the concept of trade and served as the blood-line of intellectual and economic developments throughout history". However, 'planned corridors' are a relatively recent phenomenon which first emerged in the context of urban planning in the 1950s and 1960s when the term corridor was applied to 'a linear system of urban places together with the linking surface transport media' (Whebell 1969). More specifically, an early understanding of a 'corridor' was that of two or more cities connected by linear (surface) transportation routes in an urban space within a country to facilitate the flow of goods and people (e.g., Whebell 1969, Priemus & Zonneveld 2003a). The concept expanded phenomenally and assumed new scale and significance when it was applied to connect cities in two or more regional (neighbouring) countries. This led to evolution in the objectives of corridors from mere facilitating the flow of goods and people in the urban development context to supporting international trade to promoting regional integration to enhancing economic and social development through shared regional prosperity. With globalisation gathering momentum in the early 2000s, corridors gained tremendous traction

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[2] The author is Professor in Indian Studies at Copenhagen Business School, Copenhagen, Denmark and can be reached at aradhna.aggarwal@gmail.com.

[3]Under the 'Old World Trade Routes (OWTRAD) Project' Dr T. Matthew Ciolek from Australian National University has traced the old trade routes across different parts of the world and has made them available online http://www.ciolek.com/owtrad.html#data%20sets

as a policy tool of economic and social development. Corridor development which in the initial phase was concentrated in high income developed countries/regions has in recent years received an increasing attention of the governments in developing countries as well. A variety of new corridors have sprung up ranging in geographic scope- from local to national to cross border regional ( e.g. Almaty-Bishkek Corridor) to mega transnational corridors forming land bridges for countries across different regions (e.g. Belt and Road Initiative). They are growing larger and more complex serving different objectives. Their development is being supported by the international community including the donor countries, international financial institutions, and development agencies who offer massive financial and technical assistance to develop them and work closely with the national governments. Private firms have also emerged as important players in their development through a variety of public-private partnership (PPP) contracts to form *multi stakeholder partnership corridors*. With the proliferation in the number and types, different definitions and terminologies have come to be used for them in different contexts.

Notwithstanding the fact that corridors are increasingly seen as a tool to foster regional trade and economic development, initial evidence shows that the gains are relatively modest and non uniform (World Bank 2018). Implementing the corridor policy requires a deep understanding of the types of corridors, mechanisms underlying their benefits and costs, policy options in designing strategic and implementing interventions, and tools for monitoring and evaluating them. A large body of literature covering different aspects of corridors has emerged yet there is a lack of coherent understanding of the corridor as a policy tool, the critical success factors, governance, and issues and challenges related with them. Against this background this chapter reviews the current knowledge on corridors. The objective is to draw useful lessons from international experience for policy makers in emerging economies. The specific objective of this study is manifold. It

- presents a systematic classification system of corridors to enhance our understanding of the concept of economic corridors.
- documents the evolution of corridor interventions worldwide from being purely transport sector-based initiatives to becoming economic and development corridors;
- explores the factors underlying the proliferation of regional economic corridors;
- reviews the literature on wider economic benefits and costs of corridor development in terms of economic, social and environmental sustainability;
- examines the critical success factors including preconditions, approaches and institutional arrangements needed to streamline, mobilize and facilitate corridor induced sustainable and inclusive economic development.

It draws heavily on the corridor experience of both, the developed and developing regions for knowledge on the critical aspects of corridor development and implementation. The review is based on scholarly articles published in the national and international journals, government reports, relevant official websites, but most importantly, reports produced by the multilateral development agencies ( e.g. the World Bank, Asian Development Bank, UNESCAP, WTO, UNCTAD, and African Development Bank) that have been supporting the planning, implementation, and evaluation of corridors in developing countries. It may be noted that the review covers only the planned corridors; organically grown corridors are not included in the analysis. Further, in recent years the concept of ‘corridors’ has come to be widely used in diverse sense. There are ecological corridors, wildlife corridors, forest corridors, migration corridors, power corridors and so on and so forth. The term ’corridor’ used in this analysis includes only those corridors that are *transport infrastructure-centred* and make economic sense for their existence irrespective of how they are labelled and what their specific objectives are. The World Bank uses the term ‘transport corridors’ for them as a collective noun while Hope and Cox (2015) call them development corridors. Besides, the review will focus on regional ( international) corridors but does not exclude the studies on national and local

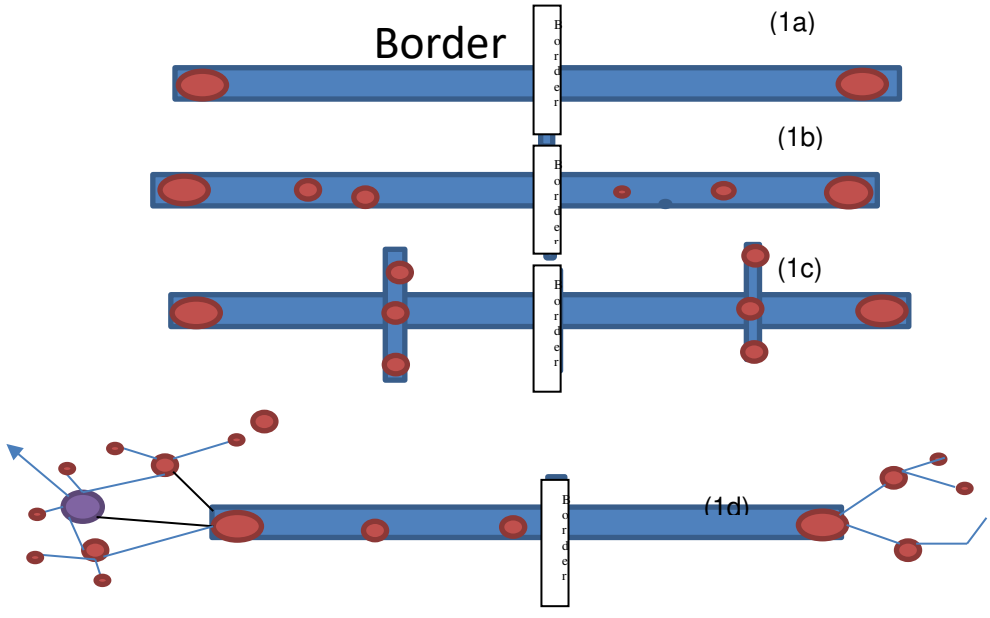
corridors from the analysis. Finally, the analysis distinguishes between different types of corridors according to their functional dimensions and draws on this distinction to provide a comprehensive understanding of the (regional) economic corridors.

The rest of the study is structured in nine sections. Section II uses the typological approach to clarify the concept of corridors. It provides the definition of different types of corridors along with a brief description of their key features. Section III examines the evolution of corridors and explores how different types of corridors emerged in different contexts across the world. Section IV identifies the factors underlying the proliferation of 'corridors'. Section V focuses on 'economic corridors' and presents the theoretical foundations underlying their benefits and costs. While doing so, it develops a framework for the 'key performance indicators' of corridors which draws on the theories of transport economics, trade, regional integration, economic geography, and spatial/territorial development; and the existing empirical evidence. It first delves into the economic benefits, which is followed by explorations into the costs and risks involved in the use of corridors as a policy tool for economic development. Section VI presents a 'conceptual framework' for the factors critical for the success of economic corridors which is informed by the existing empirical evidence from different regions. The analysis is supported by relevant examples from the European Union, North America, Asia, South America, and Africa. Finally Section VII concludes with underscoring some observations for successful implementation of this type of initiative.

## II. UNDERSTANDING THE CONCEPT AND TYPOLOGY OF CORRIDORS

There is no universally accepted definition or type of corridors. From the **physical perspective** corridors are 'bundles of transport and logistics infrastructure' (Melecky et al 2018). Trip (2003) outlines the structure of corridors in three basic network models: (i) begin-end (point-to-point), (ii) line networks, and (iii) trunk-feeder network. On the basis of this classification, Figure 1 illustrates 4 two-country regional corridor models. All four have a linear shape with "poles" at either end with a border between them. Point to point corridors are the cross border corridors connecting two economic centres (Figure 1a); line networks have nodes in between the poles (figure 1b), while trunk-feeder networks are further branched out and the intermediate nodes serve as hubs (Figure 1c). In Figure 1d, the corridor is connected with a gateway (port, airport or transnational highway or railway) on one side for global connectivity (Figure 1d).

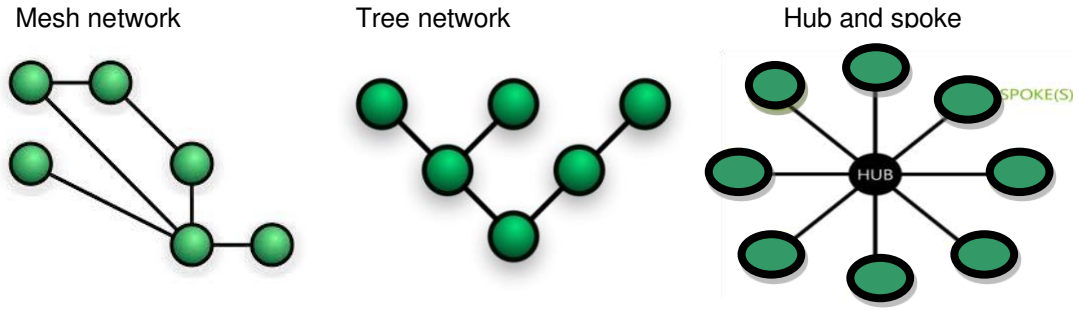
**Figure 1: Illustrative cross border regional corridor models**



Source: Georg et al (2016)

Corridors can expand from that of linear configuration "[...] into a network of linear transport routes. These can take the form of tree networks, meshes, or hub-and-spoke network systems" (UNESCAP, 2007; p. 37, Rodrigue and Ducruet 2020). A mesh/tree/hub and spoke network comprises of infrastructure nodes that connect directly, dynamically and non-hierarchically to as many other nodes as possible and cooperate with one another to improve the efficiency (Figure 2). North South Economic Corridor (NSEC) in the Greater Mekong Subregion for instance is a mesh network.

**Figure 2: Evolution of linear corridors into networks: Illustrative configurations**




Source: Based on UNESCAP (2007)

While in physical terms all corridors (as they are referred to in this analysis) are linear/ networks of linear transport routes, *their geographic,* functional and sectoral scopes vary depending on the objectives that they are aligned with. This section develops a three layered classification system for corridors with geographic, functional and sectoral scopes being three categorical variables to map out the dimensions of corridors (Figure 1).

*Typology by Geographic Scope: Local, Subnational, Regional or Transnational*

**Local urban corridors** include, (i) urban-urban transport corridors that improve transport connections between cities; (ii) urban-gateway corridors linking urban centers with international gateways (an international port, a major land border crossing, or an airport that provides a gateway to international markets); and (iii) rural-urban corridors which connect rural areas with urban centers. These corridors are a spatial planning tool and are adopted to support urban growth (GAA 2012, Melecky et al. 2018; Rodrigue et al 2009,).

**Subnational corridors** span across two or more provinces within the national boundaries of a country. The prominent examples among others are: the national trade corridors across the US, economic corridors in Indonesia, and industrial corridors in India.

**Regional corridors** Cross border regional or subregional corridors are spread over two or more adjoining countries with emphasis on cross country regional cooperation (e.g. transport and trade facilitation, and policy harmonization). These are a regional version of the national corridor and have links to at least one neighbouring country. Almaty-Bishkek economic corridor for instance is a regional corridor while Delhi-Mumbai industrial corridor in India is a national corridor.

**A transregional/continental corridor** constitutes large areas spanning across several thousand km. Six Central Asia Regional Economic Cooperation (CAREC) road and rail corridors for instance cover 29,350-kilometer (km) transport network connecting markets in

the North of the PRC with Azerbaijan in the Caucasus, Europe, and Pakistan and beyond (ADB 2012). Their overlapping geographies with 6 transcontinental BRI corridors further expand their horizon.

*Typology by functional scope*

**Transport corridors** are a *bundle of infrastructure* that connects two or more urban centres in a linear space (Priemus & Zonneveld 2003a). Transport corridors are the most basic form of corridors which are developed for providing efficient transport, load carrying, and transfer services in terms of time and economic costs aiming to facilitate the efficient and safe movement of freight, people and related information either within national boundaries ( national transport corridors) or across border (regional transport corridors) (Banomyong 2008). Depending on the number of transport modes that are being integrated, these corridors can be unimodal, bimodal or multimodal. Multimodal transport corridors are "bundles of road, rail and where possible water and pipe infrastructures connected by so-called multimodal change and transhipment locations" (VROM 1999, p.42 as referred to in Sap 2005). The Trans-Europe network of transport corridors (TEN-T) with railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad terminals is a good example of regional multimodal transport corridors[4].

**Logistics corridors** are a hub of the centers where in addition to transport, logistics services such as storage, handling and customs clearance are provided (Mulenga 2013: 10). The regional logistics corridors physically link the cross border logistics centres or zones with the aim of facilitating the efficient movement and storage of freight, and related information by harmonizing the institutional framework pertaining to logistics and all technological, organizational and legal conditions for such transportation (Banomyong 2008).

**Trade corridors:** A Trade corridor is a regional logistics corridor with streamlined and simplified trade/customs procedures and trade policy (customs information technologies; and harmonised transport, freight and custom regulations). According to Michael Van Pelt and his team (Van Pelt: 2003) "trade corridors are more than transportation (or logistics) infrastructures". They define trade corridors in terms of the functional dimension "as streams of products, services, and information moving within and through communities in geographic patterns according to a matrix or 'culture' of trade agreements and treaties, statutes, delegated legislation, and customs that govern and guide trading relationships, institutions, and structures". Van Pelt argues that trade corridors have moved the discussion from merely infrastructure to the overall context within which trade takes place including contracts and the rule of law as well as the human elements of culture. An important characteristics of trade corridors is their connection with gateways (e.g. airports and ports) that bond the economic nodes (production and distribution centres) to global trade routes (IDB 2011, Rodrigue 2020). *They* reduce transport costs, sustain the rapid expansion of trade and facilitate integration with supranational region and into global markets. Post NAFTA, cross border trade corridors proliferated in North America where freight distribution is coordinated by major gateways (container ports) and inland freight distribution clusters i.e. logistics centres (Anderson and Rodrigues 2020). Trade corridors are a significant concentration of transport and logistics activities in the region (Rodrigue 2020).

Transit trade corridors are a variant of trade corridors. In general, "transit trade corridors are designated routes between two or more countries along which the transit countries agree to cooperate with land locked developing countries (LLDCs) to apply and streamline procedures and to provide support services and access to gateways (UNCTAD 2013). They arise due to LLDCs' lack of territorial access to the sea. The functional dimension of transit transport

[4] https://ec.europa.eu/transport/themes/infrastructure/ten-t_en

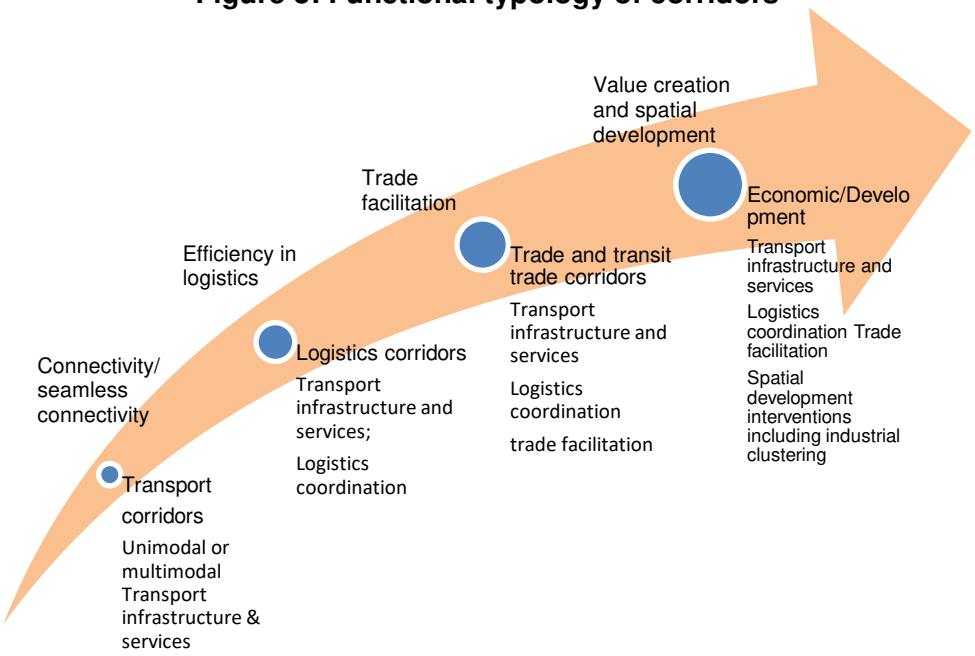
corridors involves harmonized and simple trade and logistics procedures along the corridor between LLDCs and transit countries. Northern Corridor in Africa is one of the busiest multimodal transit trade corridor encompassing: road, rail, pipeline and inland waterways transport, linking the LLDCs of Burundi, Democratic Republic of Congo, Rwanda, South Sudan and Uganda to Kenyan seaport of Mombasa. It also serves Northern Tanzania, Ethiopia and Somalia (Youssef 2019). The transregional/continental corridors of Central Asia passing through the territory of land locked countries of the region provide them access to gateways and have at the same time transformed them into transit hubs for trade among the Asian and European countries namely, Russia, Europe, East Asia, Middle East and South Asia. CAREC 1 links Europe with the People's Republic of China in East Asia via Kazakhstan and the Kyrgyz Republic (transit countries). Similarly, CAREC corridor 2 connects China to Turkey and transits through Georgia, Azerbaijan, Turkmenistan/Uzbekistan, Tajikistan and Kyrgyzstan and CAREC 3 is the connection between the Russian Federation and the Persian Gulf states via Kazakhstan, Kyrgyzstan, Tajikistan and Afghanistan. Likewise, there are other transit corridors: corridor 4 (Russian Federation–East Asia), corridor 5 (East Asia–Middle East and South Asia) and corridor 6 ( Europe–Middle East and South Asia).These corridors link Central Asia to global economic centres across the globe and have transformed them from being locked to land linked countries (ADB 2012)

**Economic corridors** aim at promoting broad-based development of unrealised economic potential along the corridor. According to Srivastava (2011), a regional economic corridor contains the following facilities and assets: (i) links to at least one neighbour, (ii) planned and/or existing SEZs (iii) links to gateways for handling international cargo, (iv) transit facilities for goods or passengers or both, and (v) electronic customs monitored through a special institutional arrangement. The functional requirement of economic corridors is to attract investment through planned/existing economic nodes including industrial estates, border economic zones and SEZs with substantive economic density and amplify the potential for economic growth of areas in between core economic node (Gálvez 2014). In other words, these can be understood as *connected series of clusters through an efficient infrastructure and a set of rules linking economic, social, and cultural communities embedded in these clusters.* For policy makers, economic corridor is a set of coordinated actions that ensure a critical mass of investments with the ability to transform the territory through physical connectivity ( transport infrastructure), trade facilitation and spatial development.

The concept was first devised by the South African government in the mid-1990s as development corridor. It was a part of the spatial development initiative (SDI) and was applied to the Maputo Development Corridor (MDC) in 1996. It was later adopted by the New Economic Partnership for Africa's Development (NEPAD) for replication throughout Africa (Hope and Cox 2015). In Asia, the term 'economic' corridors' was adopted in the 1998 Greater Mekong Subregional (GMS) Ministerial meeting and is widely used to represent development corridors. Economic and development corridors are thus two different terminologies for the corridors that integrate transport and trade with direct interventions in spatial development, both economic and social. Figure 3 summarises the types of corridors and their functional dimensions. What type of corridors should be developed depends upon the context in which they are developed as is discussed later in this study. Different types of corridors have different designs and functional requirements, and therefore call for different sets of policy and implementation interventions. While the transport corridor is an infrastructure axis with a focus on developing or improving (interconnected) infrastructure modalities on a particular route, trade corridor is a trade axis removing restrictions on the cross border movement of goods. The objective of economic/development corridors is to leverage the infrastructure network and trade facilitation to promote economic and social development. But the corridors are not static; they may evolve over time in terms of their functional dimension. The GMS economic corridors for instance have evolved in three stages: (i) from 1992 to 1997, the focus was on road projects with an idea of developing transport corridors; (ii) from 1998 to 2007, the economic corridor approach was adopted for priority corridors; (iii) since 2008, strategies and action plans

(SAPs) have been formulated for these corridors (ADB 2016, Arnold 2006). Similarly, the Agreement on Northern Transit corridor in Africa was revised in 2007 to transform it into a development corridor with a view to stimulate investments, encourage sustainable development and poverty reduction (Youssef 2019). Other corridor initiatives such as the Trans-Kalahari Corridor and the Abidjan Ouagadougou Corridor are also transformed into development corridors and assigned a wider range of additional development objectives (Byier 2015).

**Figure 3: Functional typology of corridors**




Source: Author, based on the existing literature

*Typology by Sectoral scope*

As regards the sectoral scope, most economic corridors are multisectoral as they target several industries and sectors simultaneously. However, some of them focus on selected sectors and are used as a strategic tool to promote them (Gálvez 2014). For instance, Beira Agricultural Growth Corridor links the Beira port with high potential agricultural provinces of Mozambique, Zimbabwe and Zambia. Some other examples include cross border Southern Agricultural Growth Corridor of Tanzania, Zambia and Malawi, energy corridors (oil, gas, electricity and hydrogen corridors) in the European Union (EU) (European Commission 2007); tourism corridor of the GMS; the Caspian Region Energy Corridor (Mavrakis et al. 2006); and oil corridors in many African countries.

To summarise

- The defining feature of corridors is that they are a set of linear routes physically linking hub centres with multimodal and unimodal transportation systems. While in terms of physical dimension they are all inherently designed as a single or a network of linear transport routes, the functional dimensions of corridors vary and differentiate between different types of corridors: transport, logistics, trade/transit trade, and economic/development/growth corridors. Economic or development corridors need an

integrated approach, combining physical connectivity with trade facilitation and development of economic clusters for spatial development. The types of functional requirements assigned to corridors are context specific. They need to be designed to address the most challenging issues facing policy makers in regional development.

- Corridors can be local, national, regional or transnational. The functional requirements of the local/national corridors are different from those of the regional/transnational corridors. As Galvez (2014) highlights, "the move from a national corridor to a regional corridor requires facilitating regional cooperation through different coordination mechanisms like regional blocs or dedicated corridor bodies, strengthening border policies, transport facilitation and trade and investment promotion."
- Corridors can be linked with sectoral strategy with agriculture and tourism being the key sectors in this regard.
- Finally, corridors are not static, they may be updated over time in terms of both physical and functional dimensions.

The ultimate objective of all corridors is to foster spatial and economic development through the improvement in primarily transport and logistics services available to cities and countries along the corridor and trade facilitation. Planned economic corridors are seen as a vehicle of transformation to sustain economic and social development.

## III. EVOLUTION OF CORRIDORS

The evolution of corridors can be summarised in 4 phases.

*Phase I. Emergence of the concept of corridors in urban planning :1950s and 1960s*

The term 'corridors' was first used in the late 1950s and 1960s in the context of urban spatial growth. At the core of the term was the concept of linear pattern of urbanization. The concept of linearity in urban planning was introduced in the late 19th century in Spain. It started gaining attention following Hilberseimer (1955) who provided maps which depicted 'a linear system of urban growth with strong connecting links'[5]. In a series of articles, the architectural historian George R. Collins (1959, 1960, and 1968 as quoted in Sap 2005) observed that "*linear growth is the natural pattern of growth of urban regions. Cities develop along a linear passage called corridor which is usually its artery of transport for people, for goods, and for services: roads, rails, pipes, and wires"* (Collins, Linear Planning, p.2). Thus, the corridor-concept became an explicit part of the spatial planning (Sap, 2005). The early literature (from the 1960s and 1970s) focused on the analysis and conceptualisation of these transport corridors within an urban environment. Figure 4 presents some illustrations of the urban corridors. Of them, Copenhagen Finger plan shows planned city expansion based on the corridor approach while the other two are organically grown corridors.

[5] Historically, linearity dates back to the 19th century when the Spanish urban planner Soria y Mata (1844–1920) developed an idea of the Ciudad Lineal, a linear garden city.

**Figure 4: Three illustrations of urban spatial corridors**

Copenhagen Finger Plan | Blue Banana of Europe | East Coast of the USA


Source: Georg et al (2016)

*Phase II. Emergence of international corridors in advanced countries: Late 1980s and early 1990s*

**Transport corridors in Europe.** The scale and scope of urban corridors attained a new dimension in Europe when the 'Single European Act' (SEA) was signed in 1986 which aimed to complete a Single European Market by the end of 1992. This marked the rise of developmental regionalism intrinsic to which was the idea of de-territorialisation of states by expanding their economic geography beyond borders (Doidge 2007). The vision of the Act was to create a single prosperous economic area of European Union by strengthening its social, economic and territorial cohesion. Towards this goal, efficient transport infrastructure was considered a precondition (European Commission 2011). In 1996, after years of negotiations, the European Commission launched its "trans-European Network for Transport" (TEN-T) policy (Aparicio 2016). Initially the focus was on prioritised infrastructure projects. Over time, the scope was broadened to implement harmonised and multimodal transport corridor networks across the European Union including railway lines, roads, inland waterways, maritime shipping routes, ports, airports and railroad; and measures concerning management and utilisation of the infrastructure.

In 2017, the EU's physical infrastructure under the TEN-T framework covered over 217,000 km of railways, 77,000 km of motorways, 42,000 km of inland waterways, 329 key seaports and 325 airports (European Commission website). In addition to building infrastructure, the TEN-T Network also involves horizontal measures to help speed-up border-crossing points and procedures, simplify and harmonise trade and transport related documentation (including the language regimes), implement compatible new technologies, and put in place measures to improve safety and security in all transport modes. Figure 5 depicts two multi modal EU transport corridors. Each corridor is a network of multimodal transport routes.

- Scandinavian-Mediterranean Corridor: The Scandinavian-Mediterranean Corridor represents the north-south axis for the European economy. The corridor stretches from Finland and Sweden in the North to the island of Malta in the South, taking in Denmark, Northern, Central and Southern Germany, the industrial regions of Northern Italy and the southern Italian ports.
- The Baltic-Adriatic Corridor is one of the most important trans-European-road and railway axes in Central Europe. It runs from the Baltic seaports in the north, to the Adriatic ports in the South, connecting the industrial regions of Central and Southern

Poland with those of Italy and Slovenia while crossing the Czech, Slovakian and Austrian/Slovenian boarders on its way. The corridor features key railway projects including the Semmering Base Tunnel and Koralm Railway Line in Austria, as well as important cross-border connections between the six corridor countries.

**Figure 5: Multimodal transport corridors of Europe**

Scandinavian-Mediterranean Corridor Baltic-Adriatic Corridor


Note: Solid lines are roads, chained lines depict railway lines.
Source: https://ec.europa.eu/transport/node/2443

It may be seen that while the latter forms a tree network, the former is a mesh network.

**Trade corridors in North America**: The concept of trade corridors was adopted in North America in the early 1990s at the backdrop of the deepening of North American economic integration with the Canada-US FTA coming into force in 1989 followed by the NAFTA in 1994 (Blank 2006). According to Rodrigue (2020), North American countries have historically developed a network of gateways and corridors enabling market expansion and access to the resources of the continent. The outcome is regional and subnational specialization based on comparative advantages. This led to the development of an integrated system of subnational, regional and global supply chains structured by transport networks linking production centers and distribution hubs across the continent. These supply chains depend on an efficient infrastructure and on a coherent and consistent system of regulations. Therefore North American economic system is not necessarily about trade, but about functionally integrated supply chains (Blank 2006). With the regional trade agreements coming into force, regional production networks and value chains were further extended and new production and distribution centres sprung up. The US directed its focus on promoting corridors in the early 1990s in response to increased traffic on border crossings and passed a series of corridor infrastructure related acts aimed at alleviating bottlenecks along highways and at border crossings. The term 'trade corridors' came into use for them (Kuykendall 2007). Massive allocations were made for the development of trade corridors which led to a rapid increase in their number (Blank et al 2008). Eight major north-south trade corridors connect the production and distribution centres of the three countries of North America and all of them are supported by rail (Crawford 2011). For instance, the Toronto-Windsor-Detroit-Chicago corridor, also known as the mid-continent or NAFTA corridor links major commercial centres in the Canadian and American Midwest through the Southwest with two major inland ports as the gateways: the Laredo inland port gateway into Mexico and the Great Lakes Gateway region in the North. About a third of the freight along the corridor involves auto parts produced in Southern Ontario and Maquiladora (SEZs) in the border regions of Mexico, which are used for low-cost car manufacturing in the Southeast states (Rodrigue 2020). Similarly the Los Angeles-San Diego-Tijuana corridor (Taylor 2007) and its counterpart the Vancouver-Seattle corridor in the Pacific Northwest are amongst the busiest crossing points. The maquiladoras (SEZs) of Tijuana form key economic links with San Diego County. Several corporations have constructed factory

plants in Tijuana, with the company offices and warehouses being located in San Diego contributing to trade and transportation between the two cities (Taylor, 2001:46-47). On the other hand, Vancouver-Seattle corridor has become a hub of high tech soft and hardware industries with companies such as Microsoft, Amazon, Nike, Lululemon, and Boeing being in the region. It has come to be known as 'Cascadia Innovation Corridor' (named after waterfalls along the Columbia River). In short, trade corridors are developed to link elements of existing clusters in a given area which further facilitates the emergence of new clusters along the corridor and provide the clusters with access to outside markets by enhancing efficiency in trade and transport.

*Phase III. Emergence of regional development/economic corridors in the developing world: late 1990s onwards*

While the EU focuses on regional transport connectivity to develop a single market for accelerating regional integration, in North America trade corridors are the element of deep regional integration structured by networks linking production centers and distribution hubs (Blank et al 2008) across the continent. In the developing world, however corridors were adopted in the form of development/economic corridors with a view to leverage them to promote investment activities and employment generation through direct policy interventions.

**Development corridors in Africa**. In the developing regions of Asia and Africa, the concept of corridors is extended to integrate planned spatial development initiatives for the lagging regions along corridors to leverage their potential of connecting production sites backwards with resources and forward with markets. The first deliberate attempt to develop development corridors was initiated by the South African government in the mid-1990s as part of its Spatial Development Initiative (SDI). The SDI is an investment strategy with the objective of generating economic growth in under-developed areas (Rogerson 2002, Hope and Cox 2015). A part of this initiative was implemented through the Maputo development corridor which connects South Africa, Mozambique and Maputo port with the following components: a bundle of transport infrastructure and freight logistics, institutional frameworks and procedures, and anchor projects including cluster projects for inclusion of local communities and small businesses in the process of development. Corridor development is thus incorporated within the economic development paradigm and replicated in the rest of Africa with the objectives to improve transport communications between neighbouring countries; provide landlocked countries with access to seaports; and accelerate private investment by linking production centers, urban clusters, and international gateways.

**Economic corridors in Asia**. In Asia, the concept of 'economic corridor' was introduced in the Eighth Ministerial Meeting of the Greater Mekong Subregion (GMS) in 1998 to encourage economic activities along the major roads or the transport corridors through the establishments of industrial estates, special economic zones (SEZs) and border economic zones, drawing on the development corridors of Africa. The GMS countries were the first to adopt the economic corridor approach to regional integration in the subregion. Since then there has been a series of corridor initiatives in Asia.

**Integrated regional and development axes in South America.** In 2000, South America also initiated corridor projects for achieving physical integration across the sub continent. The Union of South American Nations (UNASUR) established an intergovernmental coordination mechanism for the development of physical infrastructure to link South America's economies through new transportation, energy, and telecommunications projects (Couto 2007). The mechanism was termed as 'Initiative for the Integration of Regional Infrastructure in South-America' (IIRSA) and was entrusted with the task of implementing 10 'Integration and Development Axes' along the lines of the EU multimodal transport corridors. These were: the

Amazon Axis, the Andean Axis, the Southern Andean Axis, the Axis of Capricorn, the Escudo Guianes Axis, the Paraguay-Paraná Waterway Axis, the Central Inter-Oceanic Axis, the Mercosur-Chile Axis, the Peru, Brazil, Bolivia Axis, and the Southern Axes. Each axis comprises of a network of multimodal transport corridors encompassing urban hubs and demographic or economic concentrations along a transport route (Bender and Li, 2002). The objective is to improve connections in networked spaces with different topological depths across national territories with the objectives of promoting physical connectivity at continental scale, linking the urban nodes with their surrounding territory; and improving multimodal integration of logistic hubs (IIRSA-COSPILAN 2011). Each of these axes is under a specific Executive Technical Group which is responsible for financing and regulatory framework in communication, energy and transportation. Physical integration through these corridors is expected to support the increases in intraregional trade and eventually economic development of the region. However, in 2019, the UNASUR became defunct which may affect the continuity of these IIRSA projects in the future.

*Phase IV. Proliferation of corridors since the early 2000s*

In recent years huge investments in economic corridors across the globe have redefined the process of economic development by expanding economic geography of regions and countries beyond political borders. There seems to be an explosion of corridor infrastructure projects across all the continents of the world. A variety of economic corridors and sub corridors are being promoted at the regional and transnational levels creating a web of corridors.

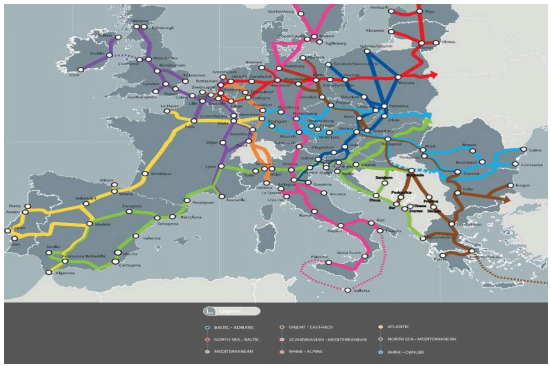
- In South Asia alone a lattice of regional corridors has been proposed which includes 10 regional road corridors/gateways, 5 regional rail corridors/gateways,10 maritime gateways, and 7 aviation gateways (De and Iyengar 2014). South East Asia is connected through Mekong, IMT- GT and BIMP EAGA subregional corridors. In addition, there are transregional corridors connecting South Asia with South East Asia. These are: the India–Myanmar–Thailand Trilateral Highway Project, the Mekong–India Economic Corridor (MIEC), the Kaladan Multimodal Transit Transport Project (India-Myanmar), and the Delhi–Ha Noi Railway Link. Further, there are mega transnational corridors such as 6 Belt and Road corridors and 6 CAREC corridors. BRI routes comprise of 30,000 km of new/upgraded railways and roads that have been constructed or are in the process of being constructed since 2013 and almost 15,000 km more in the planning stages (Reed and Trubetskoy 2018). CAREC corridors as stated above cover 29,350-kilometer (km) transport network. In North East Asia, 9 trade and transit trade corridors are in different stages of development including Siberian Land Bridge, Dalian (China-Russia), China Land Bridge (North east Asia - Central Asia), Vanino – Taishet and Tianjin– Mongolia, and Korea-Russia corridors. The aim of these projects is 'to create a network in which trade and transportation can take place throughout the region as smoothly as it does within a single country' (Mitsuhashi 2010). It must be noted that these corridors have overlapping geographies and are not mutually exclusive.
- In Sub Saharan Africa, thirty three corridors are planned/ existing, crisscrossing the continent that, if completed, would total over 53,000 km in length (Laurance et al., 2015). The purpose is to bring together the public and private sectors and community-level stakeholders in a structured manner coordinated via a spatial planning approach (AfDB 2019). A few selected development corridors are: Nacala (1900km), Mtwara, (800km), North-South (from Rwanda to Zambia 2700km), Northern (2300km), Mombasa - Addis Ababa (2000km), and Nairobi - Lusaka (2300km) (AfDB 2019).

- In South America the number of projects along 10 axes burgeoned from 335 projects with USD $37 billion in investment in 2004 to 579 projects for USD $163 billion in 2014 with total estimated investment quadrupling. There are 106 projects already completed and 179 in progress (Zibechi 2015).
- Efforts to develop European transport corridors were intensified in 2013 when the regulation (EU Regulation No 1315/2013) was adopted for development of the Trans-European Network for Transports (TEN-T). It set focus on European transport corridors rather than transport project (Öberg 2014). Further, in addition to TEN-T corridors, EU proposed to develop ten Pan-European transport corridors, which are transport corridors connecting major urban centres and ports, mainly in Eastern Europe.

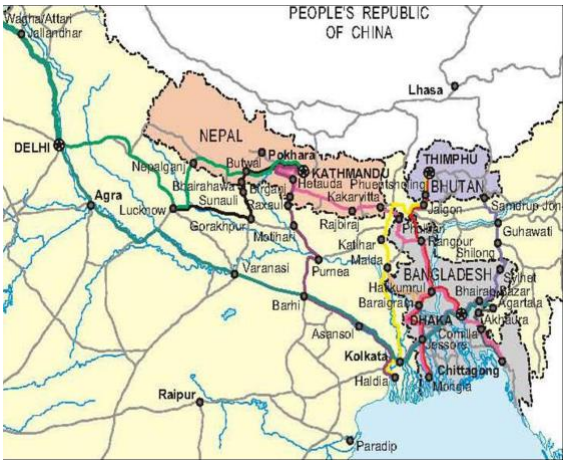
**Figure 6: Web of corridors across selected regions of the world**

Trade corridors of North America

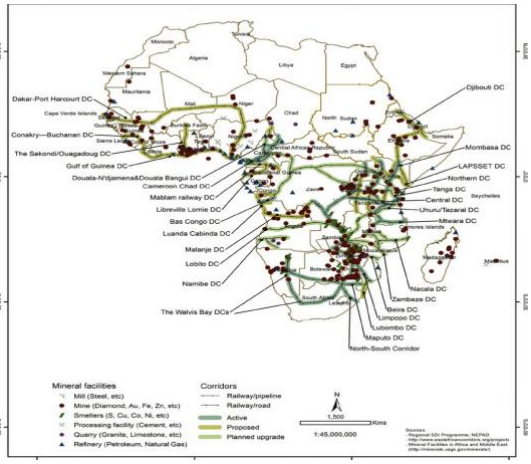

Multimodal transport corridors of EU



Economic Corridors of South Asia




Development and transport corridors of Africa




Sources: Rodrigue (2020), European commission website,

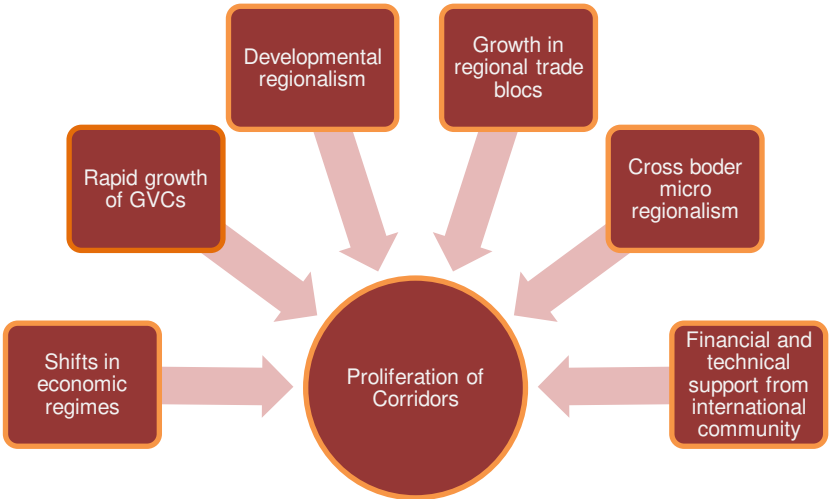
In sum, the analysis shows that there has been explosion of corridors in almost every part of the world since 2000 (Figure 6 for illustration). Further, it is shown that different types of corridors emerged in different parts of the world. Much depends on the context in which corridors are planned and developed. For instance, at the centre of the EU corridors is the single market strategy which refers to the EU as one territory without any physical or regulatory obstacles to the free movement of people, goods and services. It is expected that the single market stimulates competition and trade, improves productivity and enhances quality and drive economic growth. With intra-EU tariff barriers having been completely eliminated by 1968 and the regulatory hindrances in trade and transit fully addressed (with a common currency) by the end of 1992, a major challenge facing policy makers towards the creation of a Single European Market is how to address the high internal transport costs which is the most substantial trade cost in the region (Nathalie and Novy 2008). In this context, the multimodal transport corridors are seen as a relevant policy tool to ensure complete seamless

connections for efficient and high-quality transport services for people and freight to drive regional economic development (European Commission website)[6]. In contrast, in North America, deepening of regional integration post NAFTA led to a proliferation of complex cross border value chains resulting in a dramatic increase in freight traffic and containerised trade. This necessitated massive investments in trade corridors to handle this situation. Asia and Africa are the developing regions facing a demand and supply mismatch in regard to transport on the one hand and production and market failures in trade and investment on the other. Economic corridor are viewed as an opportunity to address both these challenges. The objective is to promote economic nodes through direct policy interventions for encouraging the flow of investment and economic activity along the corridors by leveraging their inherent advantages such as efficient transport infrastructure and trade facilitation. Corridors are thus being planned as part of the economic development strategy. For the land-locked countries a critical challenge is to have access to gateways. They therefore focus on transit trade corridors. In North-East Asia, despite the fact that all countries have their own ports with the only exception of Mongolia, they are keen on using the Greater Tumen Region (GTR) with common border among China, DPRK and Russian Federation for transit trade to optimize their trade and logistics performance and are therefore promoting trade and transit trade corridors (Sang-Won et al. 2017). In a nutshell, in different contexts different types of corridors emerged and proliferated.

## IV. FACTORS RESPONSIBLE FOR CORRIDOR PROLIFERATION

Several developments brought international trade corridors at the centre of new development paradigm (Figure 7). First, in the 1990s, the world ushered the era of globalisation with most countries shifting from an import substituting to an export oriented industrialisation regime. This led to a remarkable growth in trade between countries. In this changing context, efficiency of trade and transport corridors are seen as prerequisites of trade promotion and in turn, industrial development. Second, globalisation is associated with profound changes in the economic landscape of the world with companies increasingly fragmenting their production processes and organising them in cross country global production networks leading to an intricate network of economic interactions across borders.

**Figure 7: Factors responsible for proliferation of corridors**




Source: Author based on the existing literature

This has led to the emergence of new centers of production, trade, innovations, and finance resulting in a growing demand for connecting them. For developing countries' producers

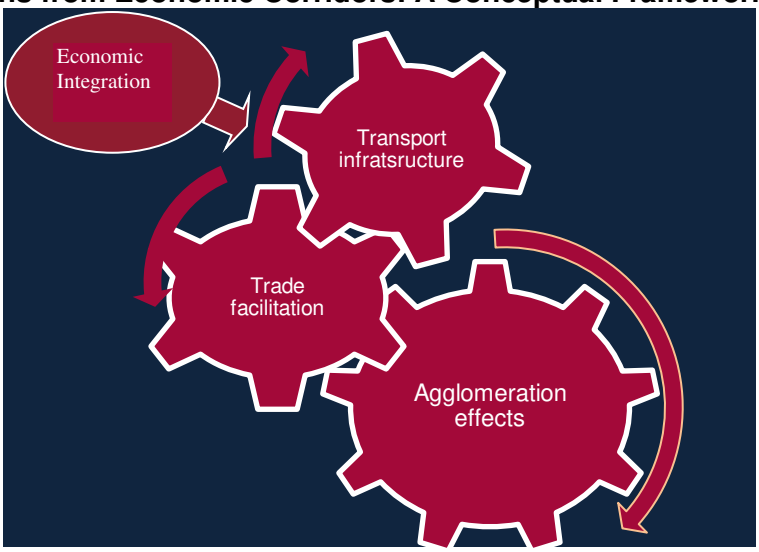
[6] https://ec.europa.eu/transport/node/2443

inserting into these value chains is crucial for gaining access to technology and marketing networks and for entering these increasingly elaborated supply chains efficient transportation systems and trade facilitation are prerequisites. Economic corridors are being developed as a move to drive the process of supply chains-induced industrialisation. Third, with the signing of the Single European Act (SEA) in 1986 a new economic development discourse initiated which focused on economic growth through regional integration. Developmental regionalism as it is called marked a shift from the passive neo liberal approach of regional integration based on trade liberalisation to a proactive approach of regional economic policies advanced and coordinated by the member states. The focus is on promoting investment and value creation through cross border and regional value chains which in turn requires physical integration through efficient cross border transport system, trade facilitation and spatial development initiatives placing economic corridors at the centre of developmental regionalism. Thus a symbiotic relationship has emerged between the economic corridors and regional trading blocs extending the concept of regional integration beyond economic and political integration to physical integration (Bolaños 2016). Fourth, the continued growth in regional blocs has provided opportunities for developing new value chains or expanding the existing ones to take advantage of the aggregation of trade transport opportunities and reinforced the need for corridors. Fifth, of late, the rise of cross border micro regionalism has become a driver of such corridors. Initially, micro regionalism was contained within the boundaries of a particular nation-state, but with the rise of development regionalism they are increasingly becoming cross border and refer to cross border integration of a limited number of states/provinces in two more countries linked together by a geographical relationship and by a degree of mutual interdependence. The objective is to bolster regional prosperity by exploiting cross border synergies from geographical proximity and economic complementarity; and generating economic value from economies of scale and clustering. These sub-regional production systems and micro economic relationships termed as regional economic corridors account for a large share of intra-regional trade and investment and are instrumental in promoting regional integration. Finally, regional infrastructure projects have also been boosted by the direct participation of international financing and development agencies in financing these projects and providing technical assistance in their planning, implementation and evaluation. Major ODA donors have included economic corridors as part of development assistance.

## V. BENEFITS AND COSTS OF ECONOMIC CORRIDORS: THEORETICAL UNDERPININGS AND EMPIRICAL EVIDENCE

The traditional approach to regionalism focused on economic integration through the lowering of trade and non trade barriers. According to this approach trade is sensitive to trade barriers, and regional integration which lowers such barriers has beneficial effects on trade and in turn economic development of regional partners. Developmental regionalism which set the context for the rise of regional corridors extends the concept of regional integration beyond economic integration to incorporate the dimension of physical integration. Physical integration means an unhindered flow of people and freight through falling costs of transport and trade, extending economic geography beyond national borders. The mobility effects of physical integration which operate through transport infrastructure and trade facilitation are further reinforced by spatial development interventions to impact on economic development and poverty reduction (Figure 8).

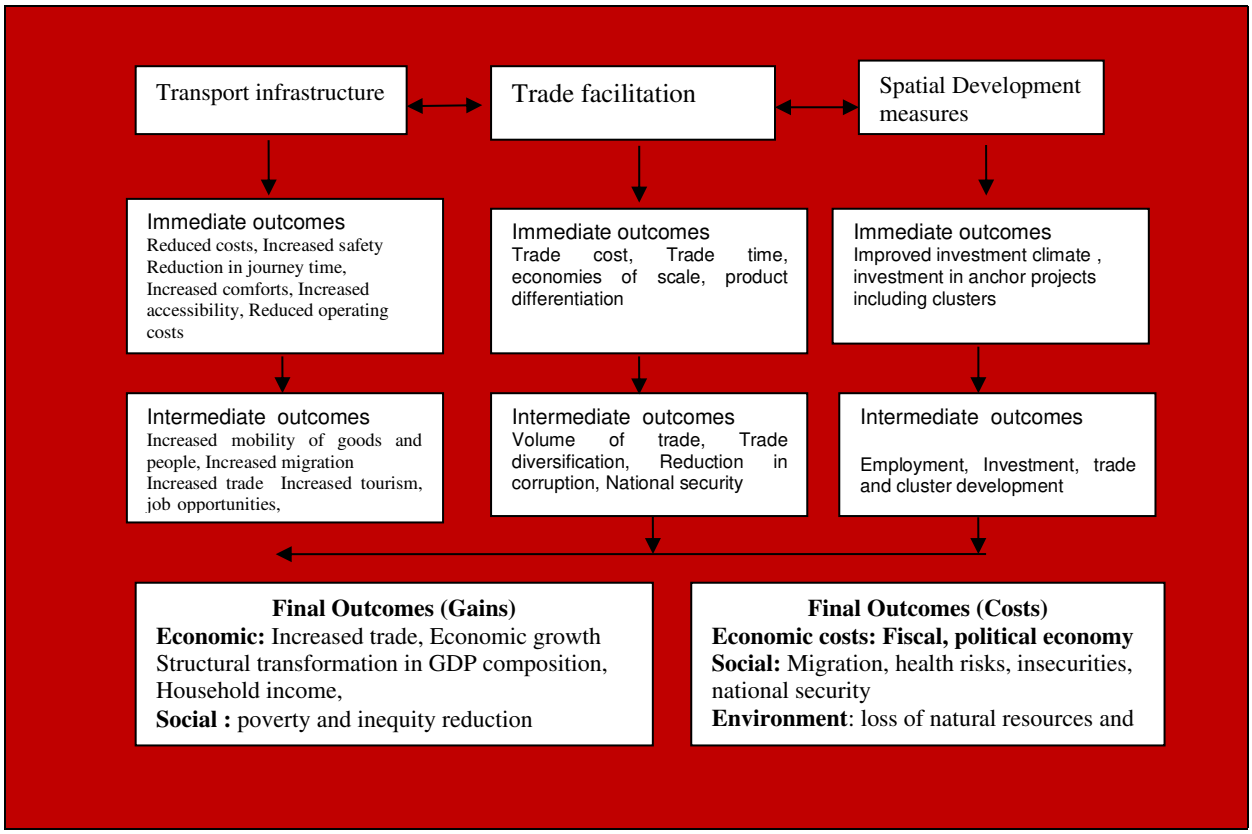
**Figure 8: Gains from Economic Corridors: A Conceptual Framework**




Source: Author

This section pulls together various theories and empirical evidence to investigate how each of the three dimensions of economic corridors: transport infrastructure, trade facilitation and spatial development works to impact on the final outcomes of corridors.

**Figure 9: Hierarchical structure of key performance indicators of regional economic corridors**




Source: Author

*Benefits of Economic Corridors*

**Transport infrastructure effects of corridors** There is almost consensus among academics, development practitioners, and policymakers that transport infrastructure is vital for economic development and human wellbeing. Transport development reduces the cost of transport as well as journey time and facilitates the availability of better services to ensure safety and comforts. This, in turn influences both the factor and product markets through mobility of labour (migration), people (tourism), capital (location/relocation of firms) and freight (trade) leading finally to acceleration in the growth of cities, trade and tourism, economic growth and poverty reduction. There is a multitude of studies that have investigated the transport related effects of corridors (see, Melecky et al 2018, Quium 2019, Berg et al 2017, Regmi and Hanaoka 2012 for a rich literature review). While there is evidence that transport effects of corridors are positive, many studies draw attention to unexpected and diverse outcomes of large scale transport structures. We discuss these effects in a structured way as under.

- Urban systems development: Whebell (1969), a geographer was the first to develop a theory about corridor development. According to him, locations differ in terms of physical surface, land, state of technology and human development (ibid, p.2). Therefore some locations thrive as settlement locations. The resources, (technological) knowledge and trade tend to move linearly between these settlements due to neighbourhood effects and economic externalities which are essentially driven by transport infrastructure. The areas through which large volumes of passenger and freight transport pass are attractive for the location of companies, especially those operating in the realm of distribution and logistics. Eventually this would lead to urbanisation in places located between present urban centres, giving way to new urban growth poles. He thus viewed the corridors as instrumental in driving the growth of cities, population density, and high land use. Even while Whebell's focus has been on national and subnational corridors, his theory lays the foundations for the potential benefits of regional economic corridors in territorial transformation.

**Box 1: Transport corridors in Africa and trade of land locked countries**

Enabled by the corridors in Africa, new trading routes have emerged, and positive development outcomes have been recorded along the way. In West Africa for example, 10 years after the African Development Bank financed the Bamako-Dakar corridor to the tune of USD 400 million, the route now carries more than 50% of Mali's import and export goods from and to the port of Dakar and has allowed the country to diversify its trading routes, reduce costs by more than 20% and increase international trade by 10%. In Southern Africa, the Nacala Corridor connects Zambia and Malawi to the Mozambican port of Nacala. Despite being the shortest route to a seaport, it was under-used because of many missing links which made the journey long and difficult. Most international shippers preferred to make the journey to the port of Durban in South Africa, much further away than Nacala. The Bank injected USD 420 million to finance approximately half of the total 1900 km corridor between Lusaka and Nacala, facilitating regional trade among the three countries. The Official Port Statistics shows an average annual growth rate of 6.2% at Nacala port between 2012 and 2016. In East Africa, the Mombasa - Nairobi - Addis Ababa corridor has received more than USD 1 billion from the Bank. The road now allows Ethiopia to trade at least 20% of its freight more competitively through the port of Mombasa. Bilateral trade between Ethiopia and Kenya has increased by 400%

.

Source African Development Bank 2019

- Trade promotion**:** Both the New Economic Geography and New Trade theories rely on the assumption that transport cost is a major cost element affecting trade. Empirically, there is humungous literature that shows the importance of transport accessibility and a reduction in transport costs and time in stimulating the volume of trade, opening up new markets, inducing new industries to form, and thereby influence the growth and patterns of trade (see Quium 2019 for an excellent survey of the literature). While analysing the intra GMS trade patterns, Fujimura and Edmonds (2006) find a strong positive relationship between the cross-border infrastructure and trade. They do not find the formal trade barriers as represented by weighted average tariff rates and trade environments as significant determinant of trade flows. Their findings are supported by recent studies conducted by Ismail and Mahyideen (2015) and Fujimura (2017). Evidence is presented that improvement in border-crossing points in the CAREC and Mekong regions has resulted in a significant drop in average time and cost in clearing borders which has had a positive impact on the volume of intra-regional trade. (ADB and CAREC 2014, CAREC 2016). As an example, ADB (2017a) finds that the reduced travel time between Bavet in Cambodia and Moc Bai in Viet Nam from about 10 hours in 1999 to half in 2013 increased cross-border trade from $10 million in 1999 to $708 million, created 3,000 jobs and implemented 41 projects worth $270 million in Moc Bai border economic zone. Box 1 provides insights into transport-induced trade benefits in the land locked countries of Africa.
- Economic growth**:** A stream of literature emerged in the 1990s which introduced transport infrastructure as a determinant of economic growth. The argument is that improvements in travel time, reductions in transport costs, increased reliability, and the introduction of new services, result in cost reductions to transport users and transport service providers (Deng 2013). These changes lead to positive impacts on household incomes, increase in employment opportunities, higher production and wages, and higher land value. Further, the increased mobility of people, improves their productivity (Asher & Novosad 2016 and Datta 2012 for India, Rospabé and Selod 2006 for South Africa, Franklin 2018 for Ethiopia; see also, Mamatzakis 2008; Baldwin & Dixon 2008; Montolio and Solé-Ollé 2009, Ismail and Mahyideen 2015; Purwanto et al. 2017). This in turn has impacts on regional production capacities (Gertler et al. 2014, Datta 2012) and household incomes (Gachassin, Najman, and Raballand 2015 for Cameroon) which can stimulate multiplier effects in the economy (Pradhan & Bagchi, 2013). Ultimately this leads to higher economic growth (Ali et al. 2015 for Nigeria, Jedwab & Moradi, 2016 for Kenya and Ghana; Bosker & Garretsen 2012 for Sub Saharan Africa; Banerjee, Duflo, & Qian, 2012 for China; Pradhan and Bagchi 2013 for India). Bosker & Garretsen, 2012 estimated that a 1 per cent increase in a country's market access is associated with a 0.03 per cent increase in its GDP per capita in Sub Saharan Africa (SSA). Briceño-Garmendia et al. (2009) in a study on 16 countries in North Africa and 24 countries in SSA, found that infrastructure (transport and other infrastructure) accounts for more than half of Africa's recent economic growth and has the potential to contribute even more in the future. There are numerous studies that have used the simulation approach to estimate corridor induced gains. Box 2 provides the results of three selected simulation exercises conducted for Asia.

Box 2: T**ransport induced gains from corridors : Selected simulation based exercises for Asia**

Hahm and Raihan (2018) used a Computable General Equilibrium (CGE) model to estimate the total economic gains from the six Belt and Road Initiative (BRI) economic corridors. The estimated gains in terms of percentage of GDP for three BRI countries in South Asia were 7% in Bangladesh, 4% in Pakistan, about 3% in India, and about 6% in Myanmar. For landlocked countries (Kazakhstan,

Kyrgyzstan, Lao People's Democratic Republic, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan), estimates vary between 5 and 10% of GDP. Some other low-income countries, such as Cambodia, may also experience growth in GDP of more than 10%.

Zhai (2012) investigated the real income gains from investment in expanded regional transport infrastructure in developing countries in Asia. The analysis has suggested that developing countries in Asia as a whole would gain about 967.7 billion in 2020, which is equivalent to 6.0% of their baseline income in 2008.

Gilbert and Banik (2010) estimated the impacts of South Asia Sub-regional Economic Cooperation (SASEC) transport infrastructure connecting Bangladesh, Bhutan, North Eastern India, and Nepal. The simulation study indicated that the cumulative impacts as a percentage of GDP would vary between 0.7% and 14.8% but the gains are distributed unequally.

Source: Quium 2019

- Structural transformation**:** The possibility of migration and inflows of capital accompanied by spatial transformation will also lead to structural transformation of the regional economies (Gollin & Rogerson, 2014 for Uganda, Mu & van de Walle 2011 for Vietnam).

- Poverty reduction: The construction of transport networks can also be a tool to address poverty. A large urban literature has focused on how the poor physical connections between jobs and residences exacerbate the unemployment and low wages of vulnerable groups and unskilled workers. The main idea is that when the poor are not well connected with jobs they experience prohibitive search costs that are detrimental to their finding or holding of a job (see Gobillon & Selod 2014: Quium 2019 for reviews). Corridors contribute to poverty reduction by improving the mobility of labour (Mu & van de Walle 2011), enhancing household income and consumption (Jacoby and Minten (2009), school enrolment in rural areas (Khandker et al. 2009); opening up the possibility of a shift from subsistence to commercial agriculture, adoption of modern farming techniques with better market access (**Gálvez** 2014, Emran and Hou 2013, Kyeyamwa et al. 2008), increased production (Dorosh, Wang, You, & Schmidt, 2012) and enhanced access to food.

**Trade facilitation effects** As discussed above, several studies have shown that improvement of cross-border transport infrastructure can substantially increase transnational trade; these effects are further reinforced by *trade facilitation along economic corridors.*

Trade effects. According to the Classical trade theoretic approach, regulatory barriers at ports and border crossing points have a negative effect on trade. The delay is particularly disadvantageous for time-sensitive products of agriculture and global value chains trade (Djankov et al. 2010, Hoekman and Shepherd 2015, Martinez-Zarzoso and Márquez-Ramos 2008, Shepherd 2013, Volpe et al. 2015). Higher time required to export, or longer border clearance procedures reduce export and import flows. According to the 2017 data from the ESCAP–World Bank International Trade Cost Database, the overall cost of trading goods (both, transport and regulatory) among ASEAN members is 76% average tariff on the value of goods traded. In South Asia, it is as high as 186% tariff equivalent. According to Berg et al. (2016), "a significant portion of trade costs in developing countries is non-physical; reflecting costs and delays associated with border crossing, price mark-ups of non-competitive transport firms, and bribes". It means that trade facilitation can bring higher trade gains than even a lessening of trade barriers (e.g., Anderson and van

Wincoop 2004; Hoekman and Nicita 2010, 2011; Arvis et al. 2011; Hummels 2007). There is a large literature that confirms the negative impact of trade facilitation on trade cost and resulting increase in volume and diversification of trade in terms of product and destination (Melecky et al. 2018; ADB 2017a; WTO 2015, for review). There is ample evidence that trade facilitation measures are associated with average trade cost reductions (ADB 2017a). Trade facilitation along the corridor reduces costs of doing trade by improving and harmonising customs and other regulatory procedures, simplifying the documents, reducing corruption and increasing transparency. For CAREC countries, ADB (2017a) findings suggest that a 10% reduction in time at the importers' border leads to an increase in intra-CAREC trade by 2%–3 %.). Further, trade facilitation can reduce cost of transactions at the border by reducing corruption. Results based on firm level and cross-country-data in developing countries confirm that longer export and import times imply more trade-related corruption (Freund et al. 2016, Sequeira and Djankov 2014, Shepherd 2009). Trade in GVCs is particularly time and cost sensitive, as these goods are more adversely affected by delays (Zaki 2014). In a study on intra-GMS trade, Fujimura (2017) uses the gravity model to show that the presence of economic corridors increases trade of intermediate goods which are vertically integrated into GVCs.

According to the New trade theory, trade needs not be a result of comparative advantage; it may simply be a way of extending the market, offering a variety of products (product differentiation) and allowing the exploitation of scale economies (Krugman 1979). It is argued that falling trade and transport costs make greater specialization possible. Greater specialization allows the countries to take full advantage of economies of scale (Krugman 2009). Economic corridors provide access to new cross border markets, thus creating new opportunities for companies to expand their activities beyond their national borders to avail increasing returns, as well as providing consumers with a wider range and higher-quality products and services, both of which according to the new trade theory are major determinants of trade. This implies that trade facilitation along economic corridors can play a crucial role in promoting and diversifying trade by lowering the cost of trade and allowing the possibilities of economies of scale and product differentiation. Evidence also points to the effects of trade facilitation on product and destination variety (Dennis and Shepherd 2011, Persson 2013, Fernandes et al. 2015).

Economic growth. It is expected that trade facilitation can give a boost to GDP growth by increasing volumes of trade. According to a study by WTO, over the period 2015-30, implementation of the TFA will add around 2.7 per cent per year to world export growth and more than half a per cent per year to world GDP growth (WTO 2015). However cross country effects are heterogeneous. Much depends on the general state of infrastructure, business environment, governance, and general quality of institutions which determine the efficiency and efficacy of trade facilitating measures. A quantitative analysis for CAREC countries for instance reveals that enhanced trade facilitation taking place only at the border crossing points may not bring broader economic gains in the CAREC economies (ADB 2017a).

Poverty reduction. There is evidence that trade facilitation has poverty reducing effects in Vietnam (Nguyen 2015 Porto 2005). Stone and Strutt (2009) valued social impacts at USD 8.1 billion resulting from moderate improvements in road infrastructure and trade facilitation in the Greater Mekong Sub-region (GMS). There is evidence that the gains from trade facilitation measures accrue disproportionately to smaller firms that are part of the GVC trade (Hoekman and Shepherd 2015, WTO 2015). Nonetheless, the evidence is not robust. UNESCAP (2013) examines the role of trade facilitation measures in increasing incomes and reducing poverty across several countries of Asia as well as different economic sectors.

**Agglomeration effects: Regional development interventions.** As mentioned above, the concept of economic corridor goes beyond the development of transport facilities and trade facilitation to promote economic activity along the corridor through direct state interventions. There are several underlying mechanisms that drive regional economic development.

- New Economic Geography. By promoting efficient industrial infrastructure, quality services, a favourable business environment, few regulatory restrictions, harmonisation and simplification of rules, and a minimum of red tape, government may induce a re-allocation of manufacturing along the corridor. When locating near each other, firms create agglomeration economies, i.e. external economies that offer to participating firms both static cost-based advantages and dynamic innovation-related benefits. While explaining why firms agglomerate, 'New Economic Geography' uses transport and trade costs as one of the key factors influencing the location decisions of firms. If trade cost is low firms tend to locate in the regions where the factors costs are low in order to reap the benefits of increasing returns to scale and serve the other markets through exports (Krugman 1991). This triggers agglomeration forces through the mechanism of 'circular causation' á la Myrdal (1957) which constitutes a self-reinforcing dynamics in the economy. Economic corridors create favourable conditions for industrial clustering in the regions that they connect by reducing transport and trade facilitation but also communication (e.g., telephone and internet) infrastructure which may interconnect markets and improve the degree of diffusion of technology, increasing productivity and hence output.

- Development of lagging border areas: According to the 'core-periphery development model in the context of the regional economic theoretic framework (Marshall, 1920, Perroux, 1955; Myrdal, 1957) economic activity tends to concentrate near the geographic centre because of the benefits of localisation and agglomeration - reduced transport costs, a developed and shared labour force, and the concentration of facilities that serve different industries - infrastructure, R&D, etc. Border regions which are economic peripheries i.e. geographically remote areas which are not well connected with the core only attract 'arbitrage' or a 'bazaar' type of economic activity, and typically, are areas of low quality development (Christaller 1933). It does not however mean that border areas are disadvantaged in terms of resources. The development of regional transport and logistics infrastructure can enhance the effectiveness and impact of border areas. The improved transport infrastructure and connectivity across countries facilitate the growth of special border economic zones and cross border economic zones, and in turn economic clustering that can further expand by the tendency of spin-offs and suppliers of both the clustered industry and related industries to locate near the zone. The network eventually grows with the economy of scale and other agglomeration economies generated in the region. Development of border economic zones may thus turn border peripheries into the centre of growth and benefit the populations of border regions that suffer from the effects of economic and social marginalisation (Aggarwal 2011).

- Global and regional production networks **:** Transport corridors and trade facilitation reforms are becoming increasingly relevant in the contemporary world where GVC trade is rapidly growing. Firms are increasingly fragmenting their production and relocating them in cost effective locations forming global and regional production networks. These time-sensitive production networks are driven by efficient logistics infrastructure and trade facilitation across borders (Kimura and Obashi 2011). Predictable and timely access to imported intermediate inputs also affects the ability of a country to export and attract GVC linked investment (Hoekman and Shepherd 2015; Shepherd 2013). Shepherd (2013) finds that increasing import licensing time by 1 percent reduces imports of intermediate inputs by 0.05 percent. Trade facilitation program in Mexico increased shipment frequencies and the number of market

destinations and finally led to increased exports, especially of those products that potentially serve as inputs to GVC trade (Carballo et al. 2016).

*Costs*

The corridor-induced regional and economic development strategy may indeed lead to economic growth and increased GDP per capita, but it may be accompanied by significant economic, social and environmental costs.

- Economic costs Corridors are highly capital intensive projects; they involve heavy costs which are incurred not only during construction phases but also in the preparation phases due to the requirement of technical expertise from the national and international sources, large scale land acquisition, and social and environmental impact assessment. Developing countries typically face a funding mismatch. This gap can be partially bridged by official development assistance (ODA) but the remaining requires soft and hard loans with many countries finding it difficult to attract private investment in infrastructure development. This can exert heavy economic burden on these economies and create a debt trap for them. A recent World Bank analysis (Bandiera and Tsiropoulos 2019) estimates that, " over the medium term, twelve of the forty-three low- and middle-income BRI member countries—in Asia, Africa, and Europe—would experience heightened debt vulnerabilities associated with BRI". According to another source[7] the China Pakistan Economic Corridor has inflicted heavy debt burden on Pakistan which is estimated to be $15 billion to the Chinese government and $6.7 billion in Chinese commercial debt. In Africa, more than half the transport infrastructure investments need to be financed by the public sector; the remaining are through ODA with the share of the private sector being minimal (Melecky et al. 2018). Economic costs of corridors may be further pushed by environment impact assessments and climate adaptation and mitigation measures. According to an estimate, seamless connectivity in Asia will require the total investment of $26 trillion over the 15-years from 2016 to 2030, or $1.7 trillion per year, including the cost of climate mitigation and adaptation. However, if these costs are not included it amounts to $22.6 trillion, or $1.5 trillion per year (ADB 2017b). Further, political economy of these corridors may add to the costs and risks associated with corridors. There is an issue of government failure in selecting location, sectors and industries on political grounds or under pressures from the activities of lobby and pressure groups, or geopolitical considerations (Ambrosio- Albalá and Bastiaensen 2010). Some of the proposed corridors could become white elephant investments with little spillover effects. Finally, international agreements on border crossings, procedures and standards involve time and cost. These are complex matters and taking common positions on them requires long processes of negotiation due to sovereignty issues and geo political concerns. International transit corridors have been perceived as even more complex mainly due to the complicated distribution of costs and benefits derived from transit.

- Social costs Corridors may have wide ranging social costs including dispossession of people from land, large scale displacement of population, land grab, forced migration of labour, unfair compensation, inadequate resettlement and rehabilitation packages to the affected people, erosion of the local community's cultural value, and the spread of communicable diseases (Enn 2018; Regondi et al 2013 for South Africa), and illegal migration and human trafficking (Zimmerman et al 2014 for GMS). Hirsch and Scurrah (2015) highlight how land acquisition was not accompanied by an adequate compensation and rehabilitation packages, and how this resulted in the loss of livelihood, land and physical assets, and food security as well related health risk

[7] https://www.livemint.com/news/world/cpec-to-inflict-heavy-debt-burden-on-pakistan-us-11574602036241.html

factors leading to various adverse social impacts. McMichael and Healy (2010) find that increasing migration associated with uneven economic growth, socio-economic vulnerabilities, and disparities between countries has elevated health risks among migrant workers. Fujimura (2014) argues that lower costs of cross-border transport may encourage illicit trades in timber, drugs, humans, wild animals, and arms. Trade and specialisation effects may exacerbate the transport induced costs by introducing the uneven pattern of *specialization* and *trade and inequities in income distribution*. There is evidence that region closer to the transport networks benefit more than those further away. In a study on the impact of transport infrastructure on economic well being of the Baltic States, it is found that all countries are benefitted by corridors but those closer to the network are benefitted more (European Commission 2019). Ghana et al. (2015) found that the Golden Quadrilateral (GQ) highway network upgrades led to a substantial increase in Indian manufacturing activity, the largest of which came from the districts within 0–10 km of the network, which accounted for 34% of the initial levels. Similar observations have been made in the context of the N–5 highway in Vietnam that has yielded high output growth effects. With better connectivity, the economic activity has surged in the two nodal cities and the provinces along NH-5. These cities have grown at the rate that is much higher than the national average (Melecky et al 2018). Gains from trade facilitation are also ambiguous. Trade facilitation may not bring benefits to the population engaged in agriculture and small and medium enterprises.

- Environmental Costs It is widely acknowledged that transportation corridors affect landscapes, wildlife species, and ecological systems (Benette 2008, Garlick 2020 for literature review) inflicting direct costs to the environment such as depletion of natural resources, deforestation, biodiversity loss, and degradation of ecosystems such as pollution, road kill, blocking of seasonal migration patterns of wildlife and habitat loss and fragmentation (see Chomitz & Gray 1996, Laurance, Goosem, & Laurance 2009). In a study of the potential environmental impacts of 33 planned or existing corridors in the Sub Saharan African it is revealed that the corridors may lead to largely irreversible environmental changes by disrupting 2200 protected/habitat areas directly or indirectly (Laurance et al 2015). Zibechi (2015) observes that the IIRSA projects in South America generated massive environmental and social resistance, as manifested in the conflicts over different projects in Brazil, Peru and Bolivia. The much hyped BRI corridors are also feared to have detrimental effects on local habitats and ecosystems (Liu al 2019). The environmental effects of economic corridors go beyond the direct effect. They can have induced transport effects due to new/upgraded infrastructure which may have far-reaching implications for regional population dynamics, species diversity, and ecosystems (Bissonette 2002, Reeves et al. 2008). In the United States, for instance these investments are believed to have contributed to the growth of urban sprawls (Brueckner 2000) and carbon emissions from extensive car use (Glaeser & Kahn 2004).

  While there is extensive literature on the transport-induced environment effects, literature has evidence on social and environmental costs of agglomerations as well. These involve air, noise and water pollution due to congestion, and emission of pollutants and dumping of hazardous wastes. The Ma Phut industrial estate in Thailand which is highly successful in terms of industrial development hosting 117 industrial plants including 45 petrochemical plants, 2 oil refineries, 8 power plants, 12 chemical fertiliser companies has generated agglomeration diseconomies with serious health issues for the citizens diminishing its economic gains and social acceptability (Soytong and Parera 2014). Fan et al (2019) document how the industrial policy of Vietnam driven by industrial estates led to increased average built-up land intensity in Vietnam after *Doimoi* and how it affected the quality of air. According to Ruta (2019), BRI

transport infrastructure is estimated to increase carbon dioxide emissions by 7 percent or more in some countries as production expands in sectors with higher emissions.

In sum, there are economic, social and environmental costs associated with corridors. In a recent study by the World Bank (Melecky et al 2018), 78 papers covering 234 separate results related to the costs of benefits of corridors were analysed using the meta-analysis technique. The results reveal the following

- There is evidence of significant positive economic impacts (at the 5 percent level or greater) with most reported impacts on levels of real income, poverty, consumption and jobs. Of the 100 results related to economic welfare, more than 80 are significantly beneficial. These positive effects can largely be attributed to transport infrastructure that has significant positive impacts on both population and assets (such as land values), as well as on levels of trade and productivity. For population and assets, 29 out of 37 reported impacts are statistically significant, while for trade and productivity, 33 out of 37 are significant. In some cases, detrimental impacts on levels of trade, population, and land values are also reported. However these are few.

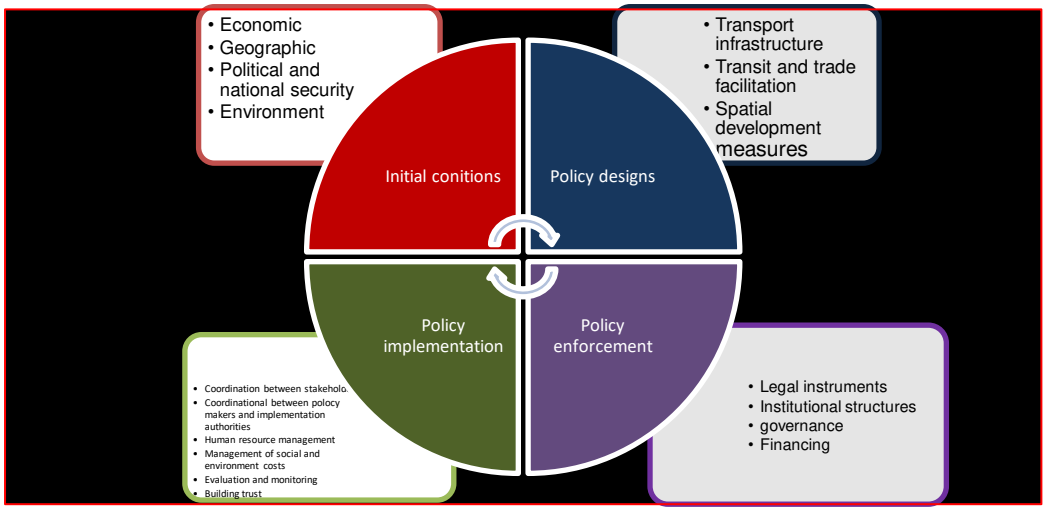
- The number of results for social inclusion, equity, and environmental quality outcomes is far fewer than those for economic welfare. There are 22 studies for social inclusion, 16 for equity, and 18 for environmental quality outcomes. However, most results are negative. All reported results for environmental quality outcomes are detrimental. Likewise, there is substantial evidence of transport infrastructure projects having significant detrimental effects on both, the levels of interpersonal income inequality and those of spatial inequality between subnational regions.

There are thus trade-offs between different economic outcomes on the one hand, and social and environmental on the other. Economic gains may come at the potential cost of worse outcomes for both environmental quality and social inclusion. Most detrimental effects are on environment quality. The existence of such trade-offs suggests an important potential role for complementary policies. However, even economic benefits may be modest and ambiguous. Brahmawong et al (2011) notes that even if the benefits of corridors exceed the costs for the host countries, cautions must be made while developing these corridors particularly when the countries have a weak law-enforcing system or an inadequate cost-internalizing scheme. This is because economic actors tend to externalize costs. A comprehensive analysis of all benefits and costs is crucial in the decision making stage itself.

## VI. THE CRITICAL SUCCESS FACTORS: AN ECONOMIC CORRIDOR DEVELOPMENT FRAMEWORK

There are a considerable number of studies both quantitative and qualitative on the critical success factors (CSFs) of corridors. While the qualitative studies draw on the corridor experience of different regions and case studies, quantitative studies identify the factors largely based on theoretical frameworks and test their effects. This chapter structures them into a framework which is founded on four pillars: Initial conditions, policy designs, policy enforcement and policy implementation. Figure 10 presents the four pillar framework.

**Figure 10: Conceptual framework for the critical success factors of economic corridors**




Source: Author based on the literature and case studies

*Initial conditions*

Initial conditions in the participating countries include the economic space, geographical features, political institutions and national security, and environmental factors. These factors set the context (or initial conditions) within which economic corridors are embedded and influence the outcomes of the corridors.

- Economic space comprises of the level of development, factor availability, and the development of land, labour, capital and product markets and trade composition. These factors matter because corridors do not create economic strength; they can only unleash the existing growth potential by removing the bottlenecks (Srivastava 2011). Thus the economic corridors which connect locations with little growth potential may not be associated with economic returns. Similarly, a corridor linking two substantive nodes but with no potential for growth in between (because of adverse geography) is also of limited interest (ibid.). Fujimura (2017) in his analysis of benefit-cost ratios for the GMS corridors finds the Southern corridor to be the most viable followed by the North-South, and East-West Corridors. He attributes it to the presence of three large economies of Bangkok, Phnom Penh, and Ho Chi Minh along its route in a relatively short distance of about 900 km. In contrast, the East-West Corridor with a distance of about 1,450 km does not involve large economy except Da Nang. However, Melecky et al (2018) in an empirical study do not find the initial development levels to be significant in determining the corridor performance after they controlled for the policy related interventions indicating that the latter more than the former.

- Geographic factors such as terrain, population density and access to gateways have important bearings on connection type, transport mode, resilience, safety, resilience to shocks, transport disruptions, potential for industrial development and environmental damages. Alma et al (2019) in a quantitative study find that large transport infrastructure investments in countries that have smooth terrain and direct access to the sea are more likely to spur economic activity. Lim et al (2017) support this finding in their survey based study. The distribution pattern of population along the corridor also is found to have a significant effect on the viability and spillover effects of transport structure (Crooke and Behrens 2017).

- A number of political factors such political stability, intergovernmental coordination between the corridor countries, territorial or military disputes, and potential security

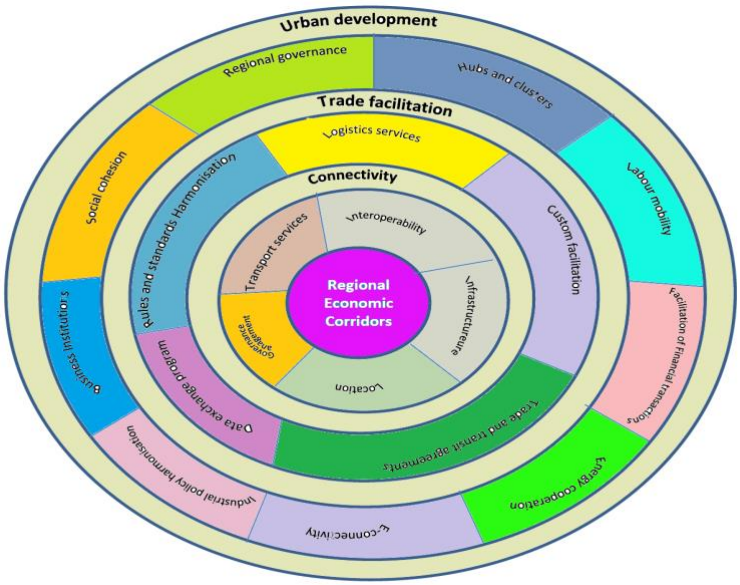
and safety threats to cargos and workers have been subject to scrutiny. Several studies have established the importance of intergovernmental coordination, geopolitical considerations, and political stability for the success of corridors (Pelletier and Alix 2011, Lee 2013, Mitsuhashi et al. 2005, Witte et al. 2012, Moon et al. 2015, among others).

- Few studies have analysed the role of the social factors in the context of corridor development. However, it is expected that cross border cultural commonalities may reinforce the economic growth potential of a corridor. The success of Vancouver-Seattle trade corridor (Cascadia innovation corridor) is partially attributed to economic and social similarities that both cities share. By joining the two cities, the corridor has restored the economic spatiality which was disrupted by the border. According to Wilson and Burgar (2019) however it is an open and inclusive culture of the cities with heterogeneous population that matters. It has attracted a large number of high tech giants and has turned into an innovation corridor as stated above.

*Strategic Policy design factors*

An economic corridor is a smart tool for integrated territorial planning that combines interventions in infrastructure and related services and simplifications of trade procedures and rules with specific actions to boost industrial clustering. It implies that the performance of an economic corridor depends on three sets of functional elements: first, an efficient multimodal transport network within a defined geography along with quality infrastructure, logistics and distribution networks: second, an enabling policy framework that eases procedures and rules to facilitate trade, and third, investment in industrial and other development projects and creation of industrial parks, special economic zones and border economic zones along the corridor for expanding economic opportunities and promotion of private investment by easing 'doing business' (Figure 11). The success of economic corridors hinges upon how this package is conceptualized, enforced and implemented.

**Figure 11: Framework for strategic policy design for economic corridors**




Source: Author

**Transport infrastructure** At the core of an economic corridor lies quality infrastructure, transport services and logistics networks which form three layers of transport infrastructure of the corridor.

- The infrastructural layer involves the provision of (i) basic infrastructure for both links and nodes in the transport system; (ii) auxiliary infrastructure such as feeder roads or railways, and utilities such as electricity and water; (iii) social infrastructure including restaurants, guest and rest houses, petrol pumps, medical facilities including ambulances, and (iv) security and safety services. The objectives should be to close gaps in physical integration and at the same time, remove bottlenecks and technical barriers in the movement of people and freight, and ensure safety, security and common facilities. Further, a corridor could be unimodal or multimodal. Multimodality refers to alternate means of transport, more capacity, more options and hence greater efficiency. According to statistics, multimodal transport can improve transportation efficiency by 30%, reduce cargo damage by 10%, reduce transportation costs by 20%, reduce highway congestion by more than 50%, and promote energy savings and emissions reduction by more than one third (Steadie Seifi et al. 2014 as quoted in Chen et al. 2019). Finally, cross-country corridors cutting through their territory could run the risk of serving mostly as transit connections. To make the most of the cross-country connectivity, there is a need to construct the feeder network to spread local socioeconomic benefits from corridors. This is particularly important for transit countries (Melecky et al 2018).

- The transport layer involves the operation of integrated transport services on the corridors ensuring efficient, safe, seamless and sustainable movement of the people and freight by providing intermodal, interoperable and sustainable transport services (European Commission 2011, UNESCAP 2018).

    - Intermodal transport implies integrated movement of people and goods using at least two different modes of transport in a single trip. It also means the use of a standardized loading unit, vehicle or "container" that can be transferred from one mode of transport to another (for instance change from road to railways to sea to air). This requires intermodal trans-shipment terminals and logistics centres, efficient 'first mile' and 'last mile' connectivity, good understanding of logistics, and integration of transport information in logistics planning (De and Iyengar 2014).
    - Inter-operability has two dimensions-technical and operational. Technical interoperability means harmonising technical parameters of the modes of transport across borders while operational operability is about implementing uniform commercial and legal framework, harmonizing the regulatory framework, harmonising transport documents, safety rules, and streamlining border crossing procedures to facilitate international traffic. Interoperability is a prerequisite for intermodality and improves the quality of the transport system along the corridor.
    - Sustainability means environmentally compatible transport with low levels of noise and air emissions. This requires innovative and trend-setting trans-shipment technologies, adoption of cleaner vehicular technologies, and adoption of cleaner fuel technologies.

- The logistical layer involves the organization of seamless and efficient transport chains (Notteboom 2012). The flow of passengers or freight through a multimodal transport system requires the involvement of actors who have the managerial capabilities to design these chains. This in turn requires the presence of logistics service providers and freight forwarders, shippers and other market parties who have the capability in

this area. In order to ensure high quality transportation services, safety, and economy for all modes or combinations of modes, logistics industry needs to be promoted as a priority industry with high level of human capability (Rodrigue and Notteboom 2020).

**Box 3. Towards an ex-ante approach for corridor policy designs: Corridor studies to prepare the ground**

In the beginning of 2014, the European Commission decided to prepare work plans for each of the 9 core corridor networks on the basis of comprehensive studies conducted by 9 teams of external consultants simultaneously under the supervision of the respective corridor coordinators. In December 2014, each European Coordinator formally submitted a work plan based on these studies under his/her responsibility to the Transport Ministers of the Member States directly concerned. The work plan includes detailed analyses of corridor features, future projections, and actions needed to bring the corridors up to the required quality and capacity standards and meet future projections.

**a) A detailed definition of the alignment of the corridors** The work plan has determined precisely the routes, transport nodes, their access links, and TEN-T connections in urban nodes or correlations with rail freight corridors to lay down a clear and commonly agreed infrastructure basis.

**b) A market analysis:** The analyses have essentially been able to forecast transport trends along the corridors for the different modes until 2030, to spot bottlenecks under different infrastructure development scenarios and to indicate the impact of TEN-T completion – for example in terms of modal shift prospects.

**c) Identification of critical issues and corridor development objectives** The market analysis provides an overview of the critical issues which hamper traffic flows along the corridors in the short, medium and longer term. They include, in particular: the lack of border crossing points, missing links or bottlenecks on other parts of the corridor, absence or insufficient quality of intermodal connections and/or their accessibility (e. g. of ports by railway lines). From such critical issues' analysis, the studies draw conclusions on the general and specific objectives for corridor development until 2030 and highlight the most pressing challenges.

**d) Project lists** Each corridor study includes a list of projects which have been identified on the basis of the experts' analysis and their cooperation with Member States and infrastructure managers which are needed to be fully complete the core network by 2030 – and to ensure these projects reach technical and financial maturity in time.

**Implementation.** These work plans are approved by the European Parliament, the Council and the Commission, and they are available for the public at large. European and national sources, lead the way for concentrated implementation efforts. The work plans guide the development of the corridors in the short and longer term. The time horizon is set for 2030, in accordance with the completion target of the core network. They integrate the objectives and priorities of EU funding, set the framework for investment in transport infrastructure - from public and private

Source: European Commission (2014b)

It is also suggested that a consolidated approach in corridor development is better than a piecemeal approach (De And Iyengar 2014). Box 3 describes the European Commission's *ex-ante* approach of evaluating the proposed corridors for preparing work plans. It is an example of the consolidated approach towards policy designs for infrastructure, transport and logistics development along a corridor.

Empirically, a number of studies have found the contribution of transport and logistics services significant in the performance of large transport projects (Melecky et al 2018, Alam et al 2019, Lim et al. 2017, Witte et al. 2012, ESCAP 2011, Krechetova 2014, Bensassi et al. 2015, Fraser and Notteboom 2014). Many have focused on the availability and reliability of logistics services and found them effective in the success of corridors (Pelletier and Alix 2011, Rodemann and

Templar 2014, Lim et al 2017). Box 4 provides the case study of Copenhagen (Denmark)-Malmo (Sweden) transport corridor.

**Box 4. Oresund transport corridor**

The Oresund corridor is one of the most dynamic sub corridors in Europe with the cities of Copenhagen in Denmark and Malmö in Sweden as its two poles. Cooperation between the two countries contributes to the region's economic success. It has a well designed strategic framework with a clear vision, objectives and action plan.

**The vision**: Two nation's one labour market.

**Approach:** Highly structured at three levels: local (the Greater Copenhagen and Skåne Committee), regional (the Freedom of Movement Council of the Nordic Council of Ministers) and national (national governments). The three layers of authorities are working together to identify and resolve obstacles.

**Best practices:** Cross-border organisations in the Oresund region: (i) identify obstacles and discuss potential solutions with the relevant authorities , (ii) provide evidence and information to encourage politicians to remove obstacles, (iii) raise awareness and work with authorities and governments, (iv) monitor the situation to avoid new obstacles, (v) provide information services for commuters. Overall 42 obstacles have been identified mainly pertaining to tax and social security issues which arise because the broader national laws are not homogenised. These are being addressed systematically. In the meanwhile, there are 19,000 daily cross-border commuters, who have helped ease the skills shortages and generated an additional EUR 6 billion of value added in the region since the Oresund Bridge opened in 2000.

Source: European Commission
https://ec.europa.eu/regional_policy/sources/docoffic/2014/boosting_growth/n46_dk_se_commuter_flows.pdf

**Trade facilitation at border crossing points** Trade facilitation is a critical factor in maximizing the economic impact of infrastructure connectivity investments. As discussed above, there is strong evidence that institutional barriers in cross border trade increase trade costs and have significant adverse effects on trade flows, diversification of trade and revenue generated from trade. The success of corridors hinges on the ability of the partner countries in reducing these transaction costs by creating an enabling policy framework that facilitates transactions at the border crossing points (BCPs). There is a large body of literature on the measures of trade facilitation. Following Eugenia Go (2018), we draw on the Trade Facilitation Agreement (TFA) that entered into force on 22 February 2017, to present an integrated framework of 5 sets of measures critical for trade facilitation along the corridors (Figure 12).

**Figure 12. Trade facilitation Measures and proposed actions**

| Policy Measures | Proposed actions |
|---|---|
| Modernization of border crossing points (BCPs) and operations | Investments and technical assistance in<br>• Border-related infrastructure (border crossing points)<br>• Physical infrastructure at the border border-proximate infrastructure (Custom, Immigration, Quarantine)<br>• Specialized software for customs (for example, ASYCUDA[8]), |

[8] ASYCUDA is a computerized customs management system developed by UNCTAD, Geneva, which covers most foreign trade procedures. The system handles customs declarations, accounting procedures, transit and

| | |
|---|---|
| | • Hardware (for example, scanners),<br>• Information and communication technology system (for example, payment and revenue systems, websites, and portals).<br>• |
| Simplification of rules, custom procedures and documentation | • Simplification and streamlining of trade-related rules, procedures, and documentation,<br>• Simplification of standards and conformity assessments through risk-based approaches,<br>• Establishing or improving single windows and collection systems |
| Cross-agency dialogue, coordination, integration | • Policy dialogue and advisory services to encourage domestic and international cross-agency coordination at the border.<br>• Establishment of a national trade facilitation committee or similar body.<br>• Cooperation between agencies on the ground at the national level.<br>• Alignment of working days and hours with neighbouring countries at border crossings.<br>• Alignment of formalities and procedures with neighbouring countries at border crossings. |
| Strengthening border agencies | • Technical assistance and specialized trainings to improve the organization of customs and other non-customs agencies involved in border operations |
| Enhancing transparency and accountability | • Publication of existing import-export regulations on the internet,<br>• advance ruling (on tariff classification) and<br>• independent appeal mechanism (for traders to appeal Customs and other relevant trade control agencies' rulings). |

Source: WTO (2013)

It is found that implementation of the TFA has the cumulative cost reduction potential of 9-10% of trade cost (WTO 2013, ADB 2017a), the greatest contributions to which are likely to come from measures to streamlining the procedures and from advance rulings. Other areas with some potential are automation, and measures to streamline fees and charges. It must be noted that the definition of trade facilitation in the agreement is relatively narrow and focuses mainly on procedural simplifications and advance rulings. According to Hoekman and Shepherd (2015), for an economic corridor a broader definition of 'any policy action that reduces trade costs' is likely to be more beneficial (particularly in landlocked countries where trade costs are generally higher than those in countries with access to the sea). An ADB study (ADB 2017a) shows that if cross-border paperless trade measures are implemented in addition to the WTO TFA measures, trade costs could be reduced by up to 16%.

**Promotion of urban centers and industrial clusters** Finally, the corridor development package involves policy interventions for spatial development by creating globally competitive spatial entities through new investment, infrastructural development and job creation (Söderbaum and Taylor 2003). The objective is to unlock inherent economic potential of the region to "crowd in" private investment. It is one of the most challenging but the most crucial aspects of the corridor. After all, the ultimate objective of the economic corridor is to bring about spatial transformation. Historically, transportation has been a tool of territorial

suspense procedures. It also generates trade data using the internationally accepted classification system that can be used for statistical economic analysis.

transformation and urban development as discussed above (Rodrigue and Notteboom 2020 for theoretical framework). However, in developing countries which are characterised by several critical bottlenecks including resource gap, knowledge gap, institutional deficit, and missing markets, the lack of transport infrastructures can be a constraining factor but by itself is not sufficient to bring about development. This requires systematic policy interventions through well developed strategies and framework (UNCTAD 2007, De and Iyengar 2014). A general set of criteria for such interventions include the following.

- Set the corridor objectives. The first and foremost, there should be a clear vision as to what the policy makers want to achieve with the corridor. It is important to situate the corridor within the wider national, regional and global contexts, identify the economic potential of the corridor region and set well defined objectives of the corridor which are aligned with the national development strategies and have support from the regional countries. Lim et. al (2017) find that the development of corridors can be facilitated when they are linked to national policies and there is intergovernmental coordination.

- Target investment projects. A good practice is to target some anchor projects in the initial stage and promote development around them. Maputo development corridor for instance in the initial stage identified gigantic projects such as Mozambique Aluminium Smelter, the Maputo Iron and Steel Project and the Beluluane Industrial Park (BIP), which is an industrial free zone aiming to attract foreign, regional and local investment to heavy industry manufacturing. These were supported by small projects in mining, chemical, and agro processing and eco tourism. Over time, the policy-makers developed MDC technical support programmes in order to complement these projects. It is important that the sectoral targeting is carried out in consultation with the private sector and other stakeholders in an effort to avoid an arbitrary selection of prioritized sectors and industries.

- Promote the existing or create new economic nodes or economic zones. These economic nodes are at the core of the economic corridors. They support value creation, improved productivity and employment generation in areas that are marginalized due to being geographic peripheries. Such nodes may comprise of a spectrum of economic zones ranging from inland container depots simply providing transfer facilities to industrial logistics centres to industrial zones to special border economic zones. The focus should be on areas with viable, but untapped growth potential to maximize the returns on investments.

- Improve the attractiveness of the region as investment destination. Industrial infrastructure should be supported by soft interventions to improve the ease of doing business through regulatory and institutional reforms in the region. Policy interventions might be needed to strengthen the product, factor and financial markets. This requires a clear understanding of the land, labour, capital, and product market conditions, and performance of the crosscutting institutions in the region. A key element is labour mobility (Melecky et al. 2018). Promoting the flow of educated migrants and upgrading their capacities are important elements of these interventions. Further, infrastructure (other than transport infrastructure) built in the region should be efficient and comprehensive. It requires not only hard industrial infrastructure ( such as industrial zones or special economic zones) but soft infrastructure including power, gas, telecommunication: business infrastructure (banks, exhibition centres and common business facilities and facilities for short stays of delegations and expats); and social infrastructure (malls, shopping centres, health and recreation). Finally, incentives could be aligned to promote healthy business competition and create better jobs.

- Promote cross border and regional value chains. The distinguishing feature of the regional economic corridor is that they can be a critical instrument in promoting regional and cross border value chains through cross border integration of industrial development with transport infrastructure and trade facilitation. But this requires harmonisation of cross border trade and industrial policies and regulatory frameworks, institutional strengthening and capacity building (Aggarwal 2019).

- Identify social projects. The lack of local community-level involvement can be a major inhibiting factor in the success of corridors. There is a need to strengthen institutions, social amenities and social services in particular education and health that can help the communities in the corridor region to evolve and become prosperous and inclusive. Further, regional SMEs development needs to be strengthened fostering youth entrepreneurship through the training and quality improvement of their products.

Thus the development of a corridor requires strategically designed coordinated approach in its planning and development depending on its objectives. Policy makers and other stakeholders should have an understanding of which features of corridors (mode of transportation, length, location, nodal connections, trade and transit facilitation, and cluster development and so on) and which complementary policies (land market reforms, improved access to finance, regulatory reforms and institution building) need to be adopted to ensure the success of a corridor.

*Policy enforcement*

Economic corridor is complex because of their complex structures and cross border nature. Strategising and implementing these corridors is complex and their enforcement requires well designed institutional structure for governance and management. Governance of the corridors can be organised into three layers: Institutional structure, Legal Framework, and financing mechanisms. According to the Melecky et al. (2018), “strengthening institutional and legal frameworks, as well as well as the capacity for the public sector to carry out structured finance tailored to the projects, is a priority when embarking on sizeable corridor investments”.

**Legal instruments** such as treaties, conventions, agreements, protocols, covenants, compacts, exchange of notes, memoranda of understanding, etc., govern corridor management and operations and are the backbone of a corridor (Grosdidier de Matons 2014). Legal instruments can be bilateral ( covering two countries), multilateral (covering many countries along the corridor), a subregional, regional, or global (international conventions). The UNESCAP (2019) provides a list of international conventions, and regional and bilateral agreements that facilitate cross border connectivity and movement of goods and peoples. Seven of the most important international road transport treaties are: the Convention on Road Traffic, 1968; Convention on Road Signs and Signals, 1968; Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention), 1975; Customs Convention on the Temporary Importation of 10. Commercial Road Vehicles, 1956; Customs Convention on Containers, 1972; International Convention on the Harmonization of Frontier Controls of Goods, 1982; and Convention on the Contract for the International Carriage of Goods by Road (CMR), 1956. At the individual level there is inertia among developing countries to ratify these conventions due to practical problems (Chuah 2017). However these conventions can find expression in the regional and sub-regional agreements on transport facilitation (such as ASEAN, Eurasian Economic Union, CAREC, ECO, and so on) and are being adopted in the context of corridors ( such as GMS and TRACECA among others). However, there is non-uniformity in the adoption of these conventions and agreements by member countries which may pose a major challenge for region-wide trade and movement of traffic.

One of the most relevant agreements and particularly ambitious agreement in this direction is GMS-CBTA which includes specific provisions for transport facilitation and is ratified by all member countries (ibid.) (Box 5).

**Box 5: The cross border transport agreement (CBTA): GMS**

The CBTA is a landmark accord, which consolidates, in a single legal instrument, all of the key nonphysical measures for efficient cross-border land transport. The CBTA includes mechanisms that enable (i) vehicles (on designated open routes), drivers (with mutual recognition of driving licenses and visa facilitation), and goods (with regimes for dangerous and perishable goods) to cross national borders through the GMS road transport permit system; (ii) avoidance of costly transhipment through a customs transit and temporary importation system and a guarantee system for goods, vehicles, and containers; (iii) the reduction of time spent at borders, through single-window inspection, single-stop inspection, information and communication equipment and systems for information exchange, risk management, and advance information for clearance; and (iv) increases in the number of border checkpoints implementing the CBTA in order to maximize its network effects and economies of scale. One of the two major components of the agreement is single-window inspection (SWI) combined with single-stop inspection (SSI). While the SWI aims to unify the windows for customs, immigration and quarantine (CIQ) into a single window, SSI, aims to unify the process and inspection of CIQ into a single step (in the entry country). Currently it is done twice i.e., by the exit country and by the entry country. Another major component of the agreement is the exchange of traffic rights (GMS road transport permit system) which allows the properly licensed Transport Operators to undertake cross-border transport operations under the CBTA. Host Countries will allow Transport Operators engaged in cross-border transport to establish representative offices to help facilitate their traffic operations. The main agreement is signed and ratified by all; the Annexes and Protocols are yet to be ratified by all[9].

To monitor the CBTA, committees have been set up at different levels of government. At the national level, each country will have a National Transport Facilitation Committee (NTFC), which consists of 10 or more national ministries or agencies. A minister or vice-minister will serve as the NTFC chairperson. At subregional level, there is a Joint Committee of the GMS Cross-Border Transport Facilitation Agreement. The Joint Committee comprises of six heads or chairpersons of the NTFCs and the ADB serves as its Secretariat.

Source: http://www.gms-cbta.org/cross-border-transport-agreement accessed on 21 March 2020

**Institutional structure**. Diverse management structures have emerged in different contexts. Most transnational corridor managements have a multi-layer structure, including an apex/umbrella body, an executive/coordination committee, and a secretariat. However, the details of their structures and institutional arrangements vary. Corridor management ranges from a complete top down intergovernmental approach as in South America to private sector-led entities as in the US. Each management structure has its strengths and weaknesses, but there is little assessment of the merits and demerits of the current management structures. De Vries and Priemus (2003) argue that the governance of corridors is a challenging task. The corridor development involves not only construction but also maintenance of the corridors and needs continuous coordination between different policy actors at various levels and a multitude of social interests.

**Financing**. Reliable and efficient financing instruments are key to the successful implementation of any policy (Carvalho et al. 2018). As discussed above, meeting investment

[9] http://www.gms-cbta.org/cross-border-transport-agreement accessed on 21 March 2020

needs for creating transport infrastructure, and its maintenance and operation is a major challenge for developing countries and can have destabilising fiscal effects in many countries. This requires a range of innovative funding mechanisms. There are diverse options ranging from grants to sovereign borrowing from concessional lenders to market borrowing. Despite that public funds cannot alone meet these demands; private funding has to be attracted to these projects.

Box 6 presents three approaches to governance of corridors in particular the institutional structures and financing mechanisms.

## Box 6: Governance of transport corridors

**EU: Supranationalism with collaborative Intergovernmentalist approach.** The EU is a unique political entity characterized by the two main features: supranationalism and intergovernmentalism. These principles guide the governance of transport corridors as well. The Maastricht Treaty provides the legal framework for establishing and developing trans-European networks (TENs)10. Under this framework, the supranational institution (e.g. European Commission) works closely with the national governments as well as domestic interest groups to govern the corridors. Regulation (EU) No 1315/2013 sets guidelines for the development of nine major multimodal corridors each of which is managed by a European coordinator, a secretariat supporting the coordinator and corridor forums. While the work plan (for infrastructure projects) is approved by the concerned states, the coordinator ensures that the work plan is established and identifies appropriate measures for infrastructure investments. In the process of creating a work plan "the coordinator may consult, together with the Member States concerned, regional and local authorities, transport operators, transport users and representatives of civil society by setting up corridor forums. The Corridor forum plays a consultative role in the formulation of work plans and follow-up measures, and is set up in agreement between the concerned states and European coordinator to ensure collaborative approach (European Commission, 2014a). In addition idea-labs (working groups of stakeholders) on specified topics can be arranged. To financially support the TEN-T projects, several EU funding programmes and initiatives have been instituted including Connecting Europe Facility (CEF*)* , European Fund for Strategic Investment (EFSI) ,Horizon 2020 *and* European Structural and Investment Funds (ESIFs) In addition, national governments' and multilateral funds are also available.

**Cooperative governance of Mekong subregional corridors: The ASEAN way.** Unlike the fully structured approach adopted by the EU, the GMS corridor program is based on the cooperative governance model of ASEAN which is characterised by continuing consultation and dialogue among GMS member countries without any legal framework in place. The institutional structure has four levels: At the top layer is the Summit of Leaders, which is generally held every 3 years and culminates in a joint statement, signed by the heads of government of member countries. At the second level is the Ministerial Conference, an annual meeting of the GMS Ministers which provides policy direction for the program and oversees progress in the GMS initiative. It is supported at the third level by the meetings of senior officials (national focal points) that are held two or three times annually to review sectoral program implementation and identify issues for discussion at GMS ministerial conferences. Finally, the institutional base for the GMS stems from the ADB-based Central Secretariat. The core institutional structure is supported by nine working groups that are responsible for coordinating the development of sector programs and activities, including providing guidance for the implementation of projects and a number of forums of various stakeholders: governors' forum, economic corridor forum, sector forums, and business forums. Their meetings are irregular and their objectives are to provide inputs and raise issues at various levels. The financing arrangements are also flexible with soft loans from ADB and AIIB contributing significantly to overall financing. Private sector involvement outside the power and tourism sectors has been limited.

**Northern Corridor in Africa:** The Northern corridor is a multi country corridor which was initiated as a transit corridor involving Burundi, DRC, Rwanda and Uganda to the sea port of Mombasa in Kenya. It is governed by the Northern Corridor Transit and Transport Agreement (NCTTA) , a comprehensive treaty with defined 11 Protocols on strategic areas for regional cooperation related

[10] https://www.europarl.europa.eu/factsheets/en/sheet/135/trans-european-networks-guidelines

to, for instance maritime port facilities, customs controls and operations, transport of goods by different modes of transport[11]. It is one of the busiest corridors and is recently transformed into a development corridor. It has adopted a formal intergovernmental approach by setting up the Northern Corridor Authority, the highest policy organ. It is a Council of Ministers responsible for transportation in the member countries. It is assisted by an Executive Board **which is a**n inter-governmental committee comprising chief executives of ministries responsible for transport in the member States. A permanent Secretariat is created (the EU practice) which is headed by an Executive Secretary who is supported by three technical experts (Custom, engineer, economist) and other non-technical staff. At national level, the Northern Corridor countries have National Trade and Transport Facilitation Committees. Finally, the Northern Corridor Stakeholders' Consultative Forum has been formed to bring together chief executives of public and private sector agencies to ensure their participation in the policy making. For funding the corridor, the annual budget of the authority is apportioned between Burundi (10%), DRC (20%), and Kenya (30%). Rwanda (15%), Uganda (25%). The payment mechanism was either by direct contribution (through Treasury) or by a tonnage levy.

Sources: Various sources

All three models of governance presented above are variants of the centrally top down approach. These arrangements range from being fully structured in the EU with fully institutionalised work plans, financing mechanisms and time schedules by supranational body to being rather flexible and loosely structured in the GMS. The northern corridor in Africa adopts a formal structure which lies somewhere between the fully institutionalised system of the EU and loosely institutionalised system of the GMS. A crucial aspect of the corridor policy is inclusion of multiple stakeholders (De Vries and Priemus 2003, Oberg et al 2018). It may be seen that all these models have incorporated the elements of collaborative approach by including multiple stakeholders in the decision making and review processes. However, what works depends on how the collaborative approach is implemented; whether the structure is more/less institutionalised may not be a key determinant of the outcomes.

*Policy Implementation factors*

Effective implementation of the corridor policy requires high degree of consensus, human capability of implementing the policy and incentive structure for compliance.

**Stakeholders' participation**. The corridor policy is explicitly cross-cutting in that it does not fit within one ministerial portfolio or one level of government, and there is often disagreement among different government organs over the policy provisions. Further, it affects different interest groups including government organisations (government agencies at the federal, state and local levels), private businesses and individuals asymmetrically generating fierce debate over the impact of the policy. The successful implementation of the corridor policy therefore requires structured participation by stakeholders in decision making. De Vries and Priemus (2003) highlight the need for coordination between various stakeholders: (1) horizontal coordination between different ministries; (2) vertical coordination between central and local government; (3) cooperation between public and private organisations; (4) cross border coordinations; (5) a multitude of social interests. While assessing the governance of the EU corridors, Oberg et al (2018) identified four areas for attention in the implementation process: more and directed information, extended involvement of private sector transport stakeholders, extended involvement of regional and local stakeholders, and involvement of stakeholders located geographically outside the immediate corridor. ADB (2010) found that in the context of the North South corridor in the GMS region the involvement of local authorities and communities was inadequate. Mechanisms to promote and support private sector participation in NSEC development were also deficient and not very effective. This situation has not altered over the years.

[11] http://www.ttcanc.org/page.php?id=14

**Effective coordination between the policy makers and implementing authority** In the case of top-down policy such as economic corridor, the prerequisite for successful implementation requires effective communication between the policy makers and implementing authorities setting the following rules for effective implementation of the policy: (i) communicate the policy clearly to the implementing agencies in the local language to void discretion and confusion which can lead to different interpretations by different officials, and also corruption and rent seeking; (ii) elaborate the tools and processes; (iii) limit the extent of change; and (iv) provide explicit outcome criteria. The case in point is the cross-border transport agreement (CBTA) introduced as one of the major policy frameworks of GMS-ECP ( as discussed above). However, weak coordination among central and local agencies involved in transport, trade, and investment facilitation has contributed to problems and delays in implementing the agreement that have already been adopted and ratified by all six countries (ADB 2018).

**Human resources**. Success, in large part, depends on the skills, capacity, and commitment of the officials in the implementation structure. Lack of awareness, knowledge, and skills in transport, trade, and investment facilitation by local officials may hinder the effectiveness of the policy. This requires training programs for capacity building with a focus on policy learning which means learning about the policy, learning about the institutional context surrounding the policy, and leaning about their role in this. Training programs should not be directed at individuals but at institutions to have a long term memory. All participants in the implementation process should have a clear understanding of what their roles are and how their performance will be evaluated.

**Managing social and environmental costs.** Economic corridors can have massive social and environmental implications. The decision to implement the policy needs to be based on a sound assessment of social and environmental impact on various groups of stakeholders. ADB has designed the Core Environment Program and Biodiversity Conservation Initiative (CEP-BCI) to achieve environmentally sound economic corridors. The main goal is to embed environmental considerations not only at the planning stage through environment impact assessment but also in the implementation of the project (ADB 2014). Box 7 presents the highlights of the initiative.

**Box 7: The Northern Corridor Project in the GMS subregion**

A key segment of the Northern Economic Corridor Project is the improvement of the stretch of road from Houayxay to Boten in Lao PDR. The improvement of the 228 km stretch of road from Houayxay to Boten in Lao PDR would not only ensure a direct link between PRC and Thailand but also provides two remote provinces - Louang Namtha and the Viangphoukha district of Bokeo - in Lao PDR increased road access. The project comprised of a social and environmental management plan. A social action plan was developed for the ethnic minorities who are affected which contains provisions for construction of community roads, small water and sanitation schemes as well as undertaking of education and HIV/AIDS awareness programs. For environmental management, local capacity building programs were undertaken. These components were planned in a participatory process involving large numbers of ethnic minority groups. Further, special care was taken to ensure that distribution of costs and benefits across the three countries was fair: since most immediate benefits were expected to accrue to the PRC and Thailand, both countries shared two thirds of project investments and provided the Lao PDR concessional resources

Source. GMS Northern Corridor project in the Booklet on toolkit for cross border infrastructure The Public-Private Infrastructure Advisory Facility published by the World Bank

**Systematic approach to evaluating and monitoring economic corridors.** Finally, a well designed framework for monitoring the performance of corridors in terms of pre-specified indicators is a crucial element of a successful implementation strategy. Corridors are a multidimensional concept covering several sectors including infrastructure, transport, investment, trade, community development and environment. It is not an easy task to assess their effects. The literature on corridor assessment and evaluation is quite extensive and covers wide ranging approaches and methodologies depending on the purpose and data. Many have adopted the modelling approach. European Union for instance has developed a regional economic model named SASI (Spatial and Socio-economic Impacts of Transport Investments and Transport System Improvements) to assess the impacts of transport on regional development. ADB (2013) has been using an advanced TCD model (time, cost and distance) model to assess the impact of CAREC corridors. Panagakos and Psaraftis (2017) provide an extensive review of the literature on methodological approach for assessing the transport effects of corridors. ADB (2014) reviews the modelling approach to corridors. Overall, any assessment should be based on the following step: (i) define the purpose of the analysis: (ii) describe sectors to be monitored (Transport, trade, investment, regional development): (iii) select appropriate key performance indicators (KPIs); (iv) scrutinise the data; (v) identify appropriate methodology; and (vi) make the findings public and implement them.

**Building trust.** Finally and most importantly, building trust is a precondition to regional cooperation. The most important thing for economic integration is to construct a relationship of mutual understanding and mutual trust among the countries of the region. Factors such as social capital, trust and other human variables play an important role in binding individual firms or entrepreneurs into value adding relationship. This in turn requires the promotion of networks of interpersonal communication and exchange, both formal and informal such as neighbourhood associations, business associations, co-operatives, choral societies, sports clubs and mass-based parties (Aggarwal 2011). Putnam (1993) argues that the more dense such networks in a community, the more likely that its citizens co-operate for mutual benefit.

## VII. CONCLUSION

The study concludes that the development of a regional economic corridor is a highly complex process. Leveraging it for economic and social development requires policy makers and other stakeholders to have a deep understanding of economic corridors as a tool of development; their economic, social and environmental implications, their transmission mechanisms and associated intermediate outcomes, the factors underlying the corridor success and supporting policies that address bottlenecks posed by policies, rules and regulations, and systems and procedures. It must also be understood that while economic corridors may bring significant gains, they are also associated with economic, social and environmental costs that need to be *ex-ante* assessed. Further, the policy designs should be based on a consolidated approach. Finally, it is a multidisciplinary and multidimensional concept based on a collaborative process and involves a large variety of stakeholders cross borders including diverse government agencies ( regional, national, provincial and local government agencies including elected representatives and bureaucrats), private sector enterprises (including funding agencies, transport companies, real estate players, production companies), civil society and most importantly communities which will be affected by the corridor development. Their representation is crucial for addressing the issues that are likely to appear in the corridor development. This can help in finding common grounds and building mutual trust and understanding between stakeholders both within and across borders which is so crucial in the use of regional economic corridor as a development tool.

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