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THE INDIAN PERSPECTIVE ON CONNECTIVITY CORRIDORS WITH SOUTHEAST ASIA: FROM BARRIER TO BRIDGE

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Abstract: Any discourse on regional economic integration is incomplete without the discussion of the importance of connectivity. Enormous opportunities and growth generated by Asia in the recent past may stop at their international borders in the absence of adequate connectivity. Therefore, the paper is set to review the overall presence of the transport corridors which connect India with Southeast Asian countries. Hence a brief examination of India's initiation of connectivity corridors, like the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Project (KMTTP), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC). Their impact on the regional economy at the national level and on the economic development of the connected areas is at the heart of this paper. Second, it attempts to find out the potential determinants of the existing freight over the economic corridor. Findings from the paper recommend that GDP and road density are positively related to the volume of freight. Once these corridors are operational, the connected region will reap more economic benefits than the non-corridor countries.

Keywords: connectivity, South Asia, corridor, growth.

INTRODUCTION

The key to understanding economic convergence and cohesion between India and Southeast Asia to facilitate the investment environment for economic growth mainly lies in endorsing logistics and infrastructure development. Efficient and improved infrastructure such as intra-regional corridor-based connectivity development is expected to join economies by bridging the geographical space and narrowing down the economic disparities between two regions by reducing

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transportation costs and time (Ghosh and De 2005; De 2013; De and Iyengar 2014; Sen 2014; De et al. 2018, 2019). Logistics infrastructure improvement and development as a form of transport corridor can further increase the overall competitiveness of the region and allow the benefits of economies of scale by providing regional cooperation, clustering economic activities by connecting the region's nodal centres, etc. Several studies have recognised spatial agglomerations as well as economic growth behaviour in the context of logistics infrastructure improvement and development (Fujita et al. 1999; Kumagai et al. 2009, 2011). A study by the Economic Research Institute (ERIA) on calculating the cumulative rise in gross domestic product (GDP) of the ASEAN countries which are connected through newly made corridors argued for 5 percent and above cumulative GDP gains for countries like Thailand, Cambodia, Myanmar, and Vietnam, and more than 2.5 percent of cumulative GDP gains in the case of India.[2] A recent study by the Research and Information System for Developing Countries (RIS) from New Delhi (De et al. 2018) suggests that the completion of current and proposed infrastructure projects like the East-West Corridor (EWC) and other international projects could herald greater economic growth for the connected region and increase its geopolitical importance. The EWC is predicted to increase freight volumes in India's states by up to 90 percent because the corridors are expected to provide cost-effective and efficient logistics services to promote trade and development.

In the case of India's infrastructure development activities on upgrading and creating new roads and highways, railways, airports, inland waterways, and ports, etc., are expected to provide more trade activity, bring people closer, and integrate the economies. Several studies have found that states with improved connectivity and access to neighbouring markets via improved corridors may benefit from intra- and inter-state economic activities as well as from neighbouring countries (De and Iyengar 2014; De et al. 2018, 2019). On the other hand, the states which have less proximity to the transport corridors might face more connectivity challenges and relatively little access to the international market (Pal 2016). India's connectivity with Southeast Asia has been designed predominantly in two ways: through intra-regional connectivity, such as the Golden Quadrilateral (GQ) projects, the Delhi–Mumbai Industrial Corridor (DMIC), and the Dedicated Freight Corridor (DFC); and through inter-regional connectivity, such as the Trilateral Highway (TH) along the Asian Highway (AH) No. 1, and the Mekong India Economic Corridor (MIEC)

[2] Kumagai and Isono (2011) used in their paper the Institute of Developing Economies (IDE)/ERIA Geographical Simulation Model to calculate the impacts on the cumulative increase of GDP of countries in the two subregions from 2010 to 2030, including the Mekong–India Economic Corridor (MIEC), the Kyaukphyu deep sea port in Myanmar, and the India–Myanmar–Thailand Trilateral Highway (IMTTH).

to name a few. India's connectivity with Southeast Asia is at an initial stage and is expected to guarantee the time-bound construction of a world-class transport network in the country. In recent years, the Indian government, along with the Asian Development Bank, the World Bank, and the Japanese government, has initiated many infrastructure projects to develop transport corridors to neighbouring countries, including the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Project (KMTTP), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC), which are expected to bring potential economic benefits to the region. These corridors are significant for India. Especially in the light of the ambitious "Act East Policy" (AEP) that aims to strengthen connectivity between India with Southeast Asia. From this point of view, this paper wants to review the overall presence of the transport corridor which connects India and Southeast Asian countries. This paper discusses opportunities under and current progress of India's connectivity projects with Southeast Asia. The rest of the paper is organised as follows. Section 2 assesses the economic opportunity that lies under the connectivity juncture. Section 3 discusses India's recent international connectivity initiations. Section 4 frames the theoretical model along with the empirical model. Results and discussions are given in section 5 and section 6, respectively. The policy recommendations of the present paper are provided in section 7. Conclusions are briefed in Section 8.

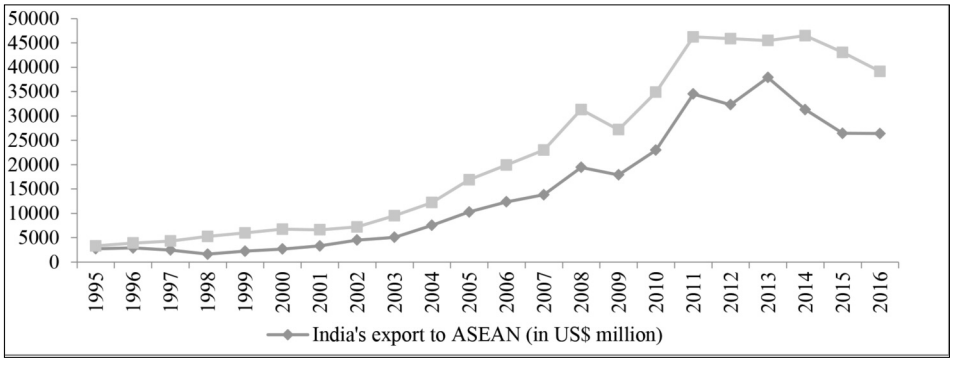
CONNECTIVITY INDUCED OPPORTUNITY BETWEEN INDIA AND SOUTHEAST ASIA

In the 1990s, the Narasimha Rao government introduced the "Look East Policy" (LEP), intending to encourage economic and strategic relations with the Southeast Asian member countries to counterbalance the influence of the People's Republic of China and also secure India's regional power across Asia. In 1992, India joined ASEAN as a sectoral partner, realising that the Southeast Asian member countries were gradually becoming the most promising regional block for international cooperation from the beginning of the 1990s. In the early 1990s, India was following a relatively inward-looking economy, and after becoming a sectoral partner, ASEAN-India relations were firmly implanted in economic, cultural, and strategic areas, and it marked a strategic shift in India's position and perspective in the global market. After more than two decades, the "Act East Policy" (AEP) was consequently adopted under the aegis of the Narendra Modi government to effectively implement the LEP, with ASEAN at its core.

Under the AEP, India's economic relations with Southeast Asia have great potential to emerge as a focal point for international trade since bilateral trade between these two has grown at an 11.9 percent Compound Annual Growth Rate

(CAGR) from 1995 to 2016, with total trade reaching nearly US $64.3 billion in 2016. In recent times, India's export has grown faster than its import from Southeast Asia. India's export to Southeast Asia as a percentage of total world trade accounted for 10.97 percent in 2016. The import share was 10.55 percent of total global trade in 2016. India's export to and import from Southeast Asia have been reported in the following Figure 1.

Figure 1: Trends in Indian Exports to and Imports from Southeast Asia, 1995-2016



Source: UNCTAD 2019.

India's main bilateral trading partners within ASEAN are Thailand, Malaysia, and Singapore (see Table 1). In the year 2005-06, Singapore accounted for more than 50 percent of India's total export to ASEAN, followed by Indonesia, Malaysia, and Thailand with a market share of 13 percent, 11 percent, and 10 percent, respectively. In the year 2016-17, export shares in the ASEAN market have experienced a major alteration where Singapore, Vietnam, Malaysia, and Thailand stand with a share of respectively 31 percent, 21 percent, 15 percent, and 12 percent in India's total exports to ASEAN. In the case of imports, the aggregate share of Singapore, Indonesia, Malaysia, and Thailand as a share of the total imports from ASEAN continues to be high (though it has declined from 92 percent to 88 percent during 2005-06 to 2016-17). Singapore was the main source from where 31 percent of total imports took place in 2005-06, which was overtaken by Indonesia, securing the share of 34.1 percent in total imports in the year 2016-17.

Table 1: India's Bilateral Trade with ASEAN countries

Country	2005-06		2016-17 (P)		CAGR (2005-06 to 2016-17)	
	Exports	Imports	Exports	Imports	Exports	Imports
Brunei	43	1	38	571	-1.12	78.08
Cambodia	24	1	115	39	15.31	39.52
Indonesia	1380	3008	3306	13872	8.27	14.91
Lao PDR	5	0	29	172	17.33	0.00
Malaysia	1162	2416	5219	8716	14.63	12.37
Myanmar	111	526	1096	1001	23.14	6.02
Philippines	495	235	1524	573	10.76	8.44
Singapore	5425	3354	9105	7441	4.82	7.51
Thailand	1075	1212	3175	5613	10.35	14.95
Vietnam	691	131	6510	2693	22.62	31.63
ASEAN	**10411**	**10884**	**30117**	**40691**	10.14	12.74

Note: Figures are in US$ million; P: Provisional; Source: MCI DC 2021; MCI DGCIS n.d.

Here comes the question of efficient trade logistics, which indicates the competitiveness needed to participate in the world economy. The logistics performance index (LPI) of the ASEAN countries along with India, China, and Bangladesh are presented in Table 2. The rank of the LPI is calculated by taking the weighted average of the following six key indicators: "(i) efficiency of the clearance process (i.e., speed, simplicity and predictability of formalities) by border control agencies, including customs; (ii) quality of trade and transport-related infrastructure (i.e., ports, railroads, roads, information technology); (iii) ease of arranging competitively priced shipments; (iv) competence and quality of logistics services (i.e., transport operators, customs brokers); (v) ability to track and trace consignments and (vi) timeliness of shipments in reaching the destination within the scheduled or expected delivery time" (http://lpi.worldbank.org/). Table 2 indicates that in terms of logistic connectivity, Myanmar is glowing underneath the average of regional logistics performance and shows the lowest position in ASEAN. Bangladesh is also in a lower position in terms of logistics services. Countries like Singapore, China, etc. are in a better position, followed by Thailand and Vietnam. Therefore, it is expected that, as these countries are connected with physical connectivity and soft infrastructure or institutional connectivity, the

development will come simultaneously. The extending and deepening of connectivity would strengthen all surrounding countries' ability to participate in trade and economic activities in the near future.

Table 2: Logistics Performance Index (LPI)

Int'l LPI Rank	Country	LPI	Customs	Infra-structure	International shipments	Logistics competence	Tracking and tracing	Time lines
80	**Brunei**	2.71	2.62	2.46	2.51	2.71	2.75	3.17
98	**Cambodia**	2.58	2.37	2.14	2.79	2.41	2.52	3.16
46	**Indonesia**	3.15	2.67	2.89	3.23	3.10	3.30	3.67
82	**Lao PDR**	2.70	2.61	2.44	2.72	2.65	2.91	2.84
41	**Malaysia**	3.22	2.90	3.15	3.35	3.30	3.15	3.46
137	**Myanmar**	2.30	2.17	1.99	2.20	2.28	2.20	2.91
60	**Philippines**	3.90	2.53	2.73	3.29	2.78	3.06	2.98
7	**Singapore**	4.00	3.89	4.06	3.58	4.10	4.08	4.32
32	**Thailand**	3.41	3.14	3.14	3.46	3.41	3.47	3.81
39	**Vietnam**	3.27	2.95	3.01	3.16	3.40	3.45	3.67
44	**India**	3.18	2.96	2.91	3.21	3.13	3.32	3.50
26	**China**	3.61	3.29	3.75	3.54	3.59	3.65	3.84
100	**Bangladesh**	2.58	2.30	2.39	2.56	2.48	2.79	2.92

Note: 1 is the lowest score and 5 is the highest score; Source: WB 2018.

A REVIEW OF INDIA'S CONNECTIVITY CORRIDOR WITH SOUTHEAST ASIA

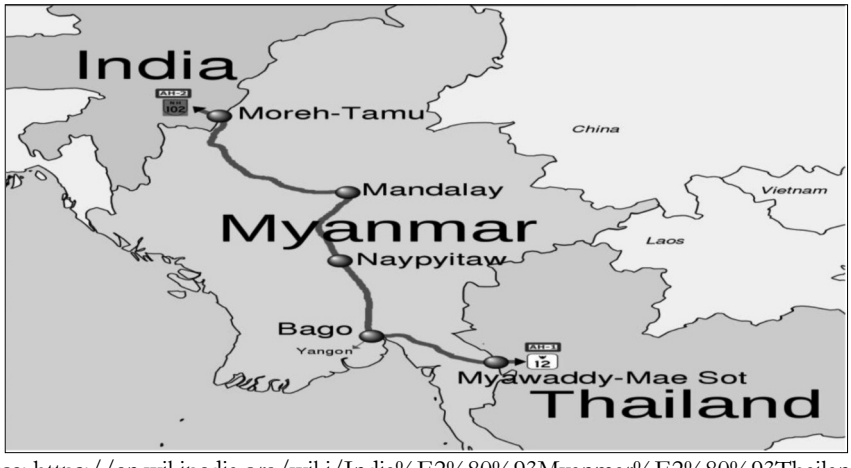
Initially, the cross-border linkage between India and Southeast Asian countries has been restricted to only the ocean and the air. Later, there has been a realisation that the economic relationship between India and Southeast Asia enormously depends on effective road transport links. Therefore, India, along with the Asian Development Bank, the World Bank, and the Japanese government, has initiated many modes of connectivity projects to bind Southeast Asian countries on one

hand and to boost the unexploited economic potential of both regions in terms of trade and investment on the other. Some of the most significant and prominent regional connectivity projects between Southeast Asia and India are namely, the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Project (KMTTP), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC), which connect India with the neighbouring countries in the east, namely, Bangladesh, China, Myanmar, Thailand, Cambodia, Vietnam, and beyond. There are other proposed and ongoing connectivity projects, the Tiddim-Rih-Falam Road, the Stilwell Road, India-Nepal Connectivity, India-Bhutan Connectivity to name a few. This section will try to review selected projects one by one in this paper.

The Trilateral Highway

In April 2002, the India-Myanmar-Thailand Trilateral Highway (TH) was primarily proposed at a Trilateral Ministerial summit, Yangon. This international project was designed to connect Moreh, in the Manipur State of India, to Mae Sot in the Tak Province of Thailand via Myanmar. It is proposed to link two border crossings, namely India–Myanmar, and Myanmar–Thailand, and then cover four customs check-points, three international time zones, three customs EDI systems, two different vehicle-driving standards, and three different motor-vehicle laws. This cross-border transportation network is financed by the governments of India, Myanmar, and Thailand (see Figure 2).

Figure 2: Trilateral Highway Map



Source: https://en.wikipedia.org/wiki/India%E2%80%93Myanmar%E2%80%93Thailand_Trilateral_Highway.

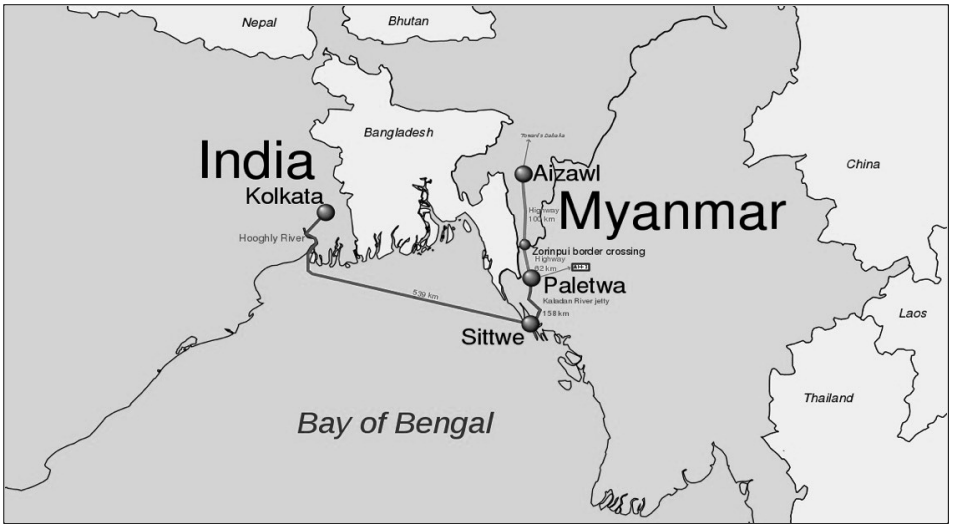
The approximate length of this highway would be 1,360 km. Under the proposed transportation network, India is committed to building 78 km of missing links, repairing 58 km of existing roads, and upgrading a further 132 km of roads in Myanmar. India has also taken the responsibility of improving 69 bridges on the Tamu-Kalewa Friendship Road and upgrading 120 km of the Kalewa-Yargyi, broadening to a highway pattern. In terms of project completion, India is said to have completed approximately 132 km towards the Myanmar side. Myanmar has finished the expansion of the Yargyi to Monywa part of the highway.

The objective of this highway project is to establish land road connectivity between India, Myanmar, and Thailand, which should be completed by 2020. Furthermore, it has proposed to expand the road connectivity to Lao PDR, Vietnam, and Cambodia to attach greater impetus to the growing trade and investment linkages between Southeast Asia and India.

The Kaladan Multi-modal Transit Transport Project

In 2008, India and Myanmar signed two protocols (namely, Protocol on Transit Transport and Protocol on maintenance) and a framework agreement on the Kaladan Multi-modal Transit Transport Project (KMTTP). It is a multi-modal transportation connectivity project jointly recognized by India and Myanmar to construct shipping of freight from the north-eastern parts of India to Myanmar to give an alternate mode for transportation of goods and services. It envisions connecting roads and inland waterways between the north-eastern ports of India and the Sittwe port in Myanmar. It is committed to improving two major components of the current connectivity between India and Myanmar, such as (a) development and improvement of the port and Inland Water Transport (IWT) between Sittwe and Paletwa (Myanmar) along with the Kaladan River, and (b) construction of about 129 km highway from Paletwa (Myanmar) to Mizoram (India). Further, the project includes (a) building and dredging of an integrated port and IWT terminal at Sittwe in Myanmar; (b) construction of about 158 km of the navigational channel along the Kaladan River from Sittwe to Paletwa in Myanmar; (c) upgrading of the highway transhipment terminal at Paletwa in Myanmar; (d) construction of six IWT barges (each with a capacity of 300 tonnes) for transportation of freight on the Myanmar side between Sittwe and Paletwa; and (e) construction of a 109 km highway from Paletwa in Myanmar to Zorinouri on the Mizoram border in India (see Figure 3).

Figure 3: Kaladan Multi-modal Transit Transport Project Map



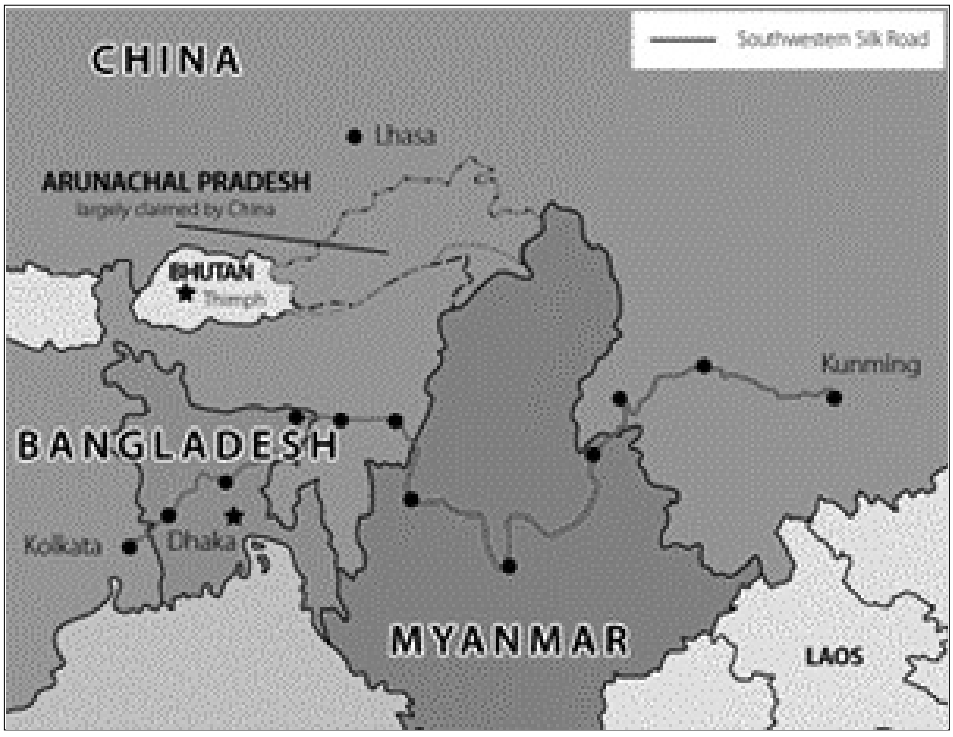
Source: https://en.wikipedia.org/wiki/Kaladan_Multi-Modal_Transit_Transport_Project.

The construction has been completed for the integrated port-IWT jetty at Sittwe in Myanmar. This corridor is expected to connect the NER of India, thereby reducing the traffic load on the Siliguri Corridor. In the absence of a substitute route, the development of this project would not only provide economic, marketable, and strategic benefits but also contribute to the overall development of India and its economic integration with Myanmar.

The Bangladesh-China-India-Myanmar Economic Corridor

This is an important connectivity project where Bangladesh, Myanmar, and India are going to be connected with China by road. The Bangladesh-China-India-Myanmar Economic Corridor (BCIM-EC) is aimed at connecting these four major economic hubs in Asia. The BCIM-EC includes Kolkata in India and then passing through Myanmar via Bangladesh to Kunming in China's Yunnan Province. This connectivity is supposed to cross four border crossings, which are between China – Myanmar, Myanmar – India, and two in India – Bangladesh. It is expected to cross eight customs check-points, four international time zones, two different working weeks, four customs EDI systems, two different vehicle-driving standards, and four different motor-vehicle laws. The proposed corridor would cover 2,800 km, encompassing the route of Kolkata, Dhaka, Silchar, Imphal, Mandalay, Tengchong, and Kunming (see Figure 4).

Figure 4: Bangladesh-China-India- Myanmar Economic Corridor Map



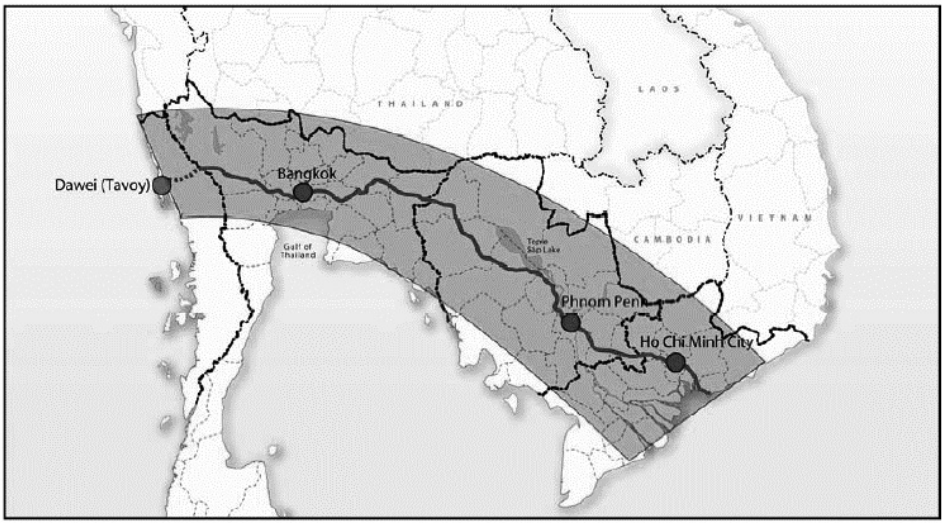
Source: Asia Briefing n.d.

The 2,490-km route of the K2K Highway is already constructed, connecting through Kolkata, Dhaka, Imphal, Mandalay, Lashio, Muse, and followed by Kunming. It also connects Ledo in Assam (India) through the old Stilwell Road (Myanmar). It is expected to be in operation very soon.

The Mekong-India Economic Corridor

The Mekong Countries of MIEC announced an ambitious corridor project in which the four Greater Mekong countries, namely Myanmar, Thailand, Cambodia, and Vietnam, will be connected with the Mekong-India Economic Corridor (MIEC) from end to end in its east coast region with India. It will connect Ho Chi Minh City (Vietnam) with Dawei (Myanmar) through Bangkok (Thailand) and Phnom Penh (Cambodia) and further connect to Chennai in India. Incorporation with India will likely add impetus to corridor development with the growth of trade and investment associations between India and four Mekong countries (see Figure 5).

Figure 5: Mekong-India Economic Corridor Map



Source: ERIA 2009.

The completion of this corridor is expected to enhance the trade and investment scenario between India and four Mekong countries by minimising the distances and time by removing the supply-side blockage. The corridor is expected to boost opportunities for four Mekong countries, viz. Myanmar, Thailand, Cambodia, and Vietnam, along with India, by constructing a world-class transport infrastructure to create a stronger economic and industrial base for all the countries. The emphasis is put on the corridor expanding the manufacturing base of the Mekong countries with the rest of the world, particularly with India. This is also expected to be operational in a few years.

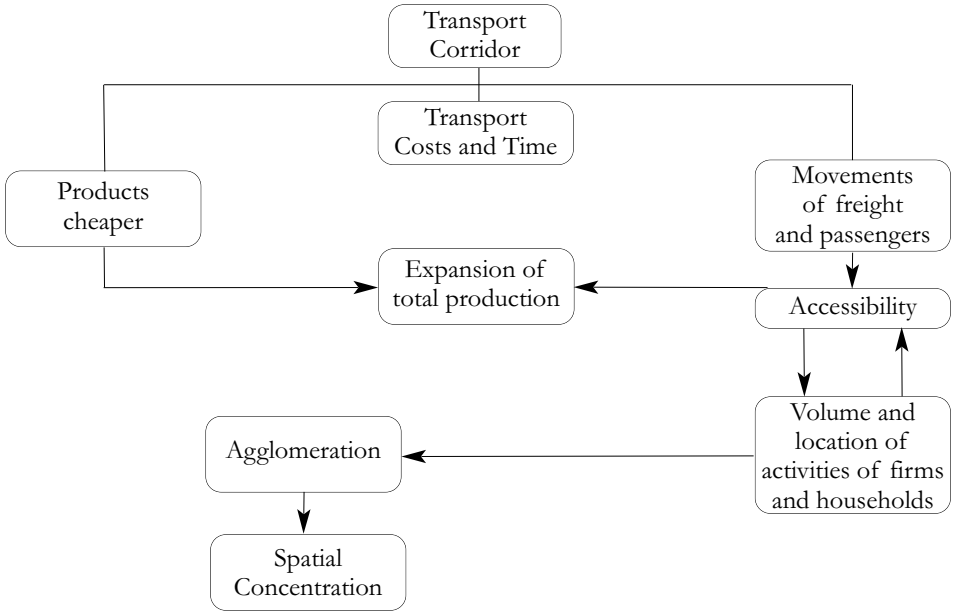
India, along with ASEAN, has been working on several integration and cooperation initiatives over the years. India attaches high importance to these connectivity projects, particularly the Trilateral Highway and the Kaladan corridor, which are currently under implementation. India's perspective on connectivity corridors with Southeast Asia is the main theme of the paper since South and Southeast Asia together form a significant geographic zone in continental Asia. South Asia is an economic bloc comprised of the world's largest group of people, with a population of 1.752 billion (as of 2017, Penn World 9.1). It represents 40% of Asia's total population, allowing it to influence global market demand more than any other regional bloc. Not only did this bloc contribute 10% of Asian GDP in 2016 (United Nations, 2018), but it goes without saying that India is the most important player. Southeast Asia (ASEAN), on the other hand, has 647 million inhabitants and contributed 8% of total Asian GDP (as of 2017,

Penn World 9.1), and ASEAN is expected to become a major player on the Asian continent, after China and India. Therefore, connecting Southeast Asia with India is an important agenda under the ambitious AEP to utilise the economic power and to counterweight the economic and strategic influence of the People's Republic of China.

THE MODEL

The promotion of a connectivity corridor is essential for a country as high transportation costs and low connectivity across regions are detrimental to trade and investment. Therefore, there is a bivariate association between income and infrastructure. This is because any form of infrastructure development can boost the country's output by improving production and consumption linkages. Literature-based on the economic impact of transport facilities discusses three approaches. The first approach believes in the social cost-benefit analysis with consumer surplus as the main object. This approach has been widely used in many countries with the objective of welfare economics. More recently, a second approach has been evolved which is based on productivity rather than consumer surplus. The outcome of this approach is mainly based on the travel time savings of households, which do not have direct implications for GDP. The third approach is far away from the above two views and is mainly based on employment. In this approach, investments in the transport road and rail network have spatially differentiated impacts on employment. Although these approaches are inter-linked and partially complementary, they are insufficient to discuss the macroeconomic impact in terms of change in GDP. To fulfil this gap, this paper tries to develop a relationship between connectivity corridors with regional economic development (see Figure 6) and further tests that model empirically.

Figure 6: Model on the relation between the transport corridor and its economic impact



Source: Drawn by Author.

Improvement of transport corridors influences production and household consumption through lowering transportation costs. This may generate a redistribution effect among economic groups and also among regions. The relationship between transport corridors and their impact on regional development is illustrated in Figure 6 while considering more than one sector. Improved and efficient transport infrastructure can minimise transportation costs and time by increasing the average speed of the transport system. This directly influences the movements of freight and passengers by making the production process cheaper. This reduction helps a firm to increase productivity and accessibility. Therefore, this increase in efficiency and accessibility in a certain region (or country) may result in an expansion of economic activities. This further influences the number of movements of freight and passengers as a result of the relocation of economic activities. For instance, the government invests in infrastructure to develop the associability of each region with a relatively positive economic expansion to defeat congestion. Overall, these improvements in transport infrastructure help other sectors (like technology, demography, the economy, and environmental and public policy) directly or indirectly.

To test this framework empirically, the estimation will be based on the following baseline equation:

$$X_{it}=\alpha_0+\alpha_i+\beta_1 Y_{it}-\beta_2\tau_{ij}+\beta_3 I_{it}+\beta_4 C_{ki}+\beta_5 Z_i+\varepsilon_i \quad (1)$$

where *i* represents a country, *t* time, and ε_i is the error term. The dependent variable is total freight movement via land, air, and sea routes. Total freight is calculated by aggregating the freight movement via land, air, and sea routes in billion tonnes. The data on freight has been collected from different sources like the Directorate General of Civil Aviation, the Ministry of Civil Aviation, Road Transport Year Book, Transport Research Wing, the Ministry of Road Transport & Highways, the government of India, and the World Development Indicators. Our independent variables include Gross Domestic Product (GDP), trade costs, road density, vehicle speed, and different corridors. *Y* is the real expenditure where GDP has been taken and is the trade cost. The GDP at current prices is taken in US$ million, and the data sources are the Reserve Bank of India and the World Development Indicators. Trade cost measures are based on the aerial distance between India's capital Delhi and the respective country's capital in km. Distance data has been collected with the help of Google Maps. *I* is a vector of other independent variables such as road density and vehicle speed, which are taken to proxy the infrastructure, particularly those that will give the essence of accessibility and quality of physical connectivity. Road density is calculated as a ratio of the total road length in km to the total area in square km of that country. The data sources for this variable are the Ministry of Road Transport and Highways, the government of India, Statistical Year Book India, 2016, Census of India, 2011. The speed of vehicle data has been collected from different kinds of literature and denotes the average speed of a vehicle in km per hour (see Appendix 1). *C* captures the effect of transport corridors on freight movement, wherein corridor (*k*) is the Trilateral Highway, the Kaladan corridor, the BCIM-EC, and the MIEC respectively. All the corridors are a categorical variable in the model, where it takes '1' when the corridor (*k*) crosses the respective country or '0' otherwise. *Z* is the series of interaction variables to capture the effect of economic corridors on freight movement. All regressions include country-fixed effects.

To carry out the future projections over a long time horizon, the growth rate of freight movement *i* has been obtained using equation (2), where an interaction term between GDP and freight has been taken.

$$\ln X_{it}=\sigma+\delta_{it1}\ln Y_{it} \quad (2)$$

Differentiation of the demand equation (1) for freight movement *i* with respect to time would yield the relation (where a hat (^) on the top of a variable denotes its rate of growth):

$$\hat{X}_{it} = \delta \hat{Y}_{it} \tag{3}$$

This simpler equation can be used to project future freight demand by using the income elasticity of the freight demand and the expected future growth rate, *g*, of GDP.

$$X_{it} = \alpha_0 + \alpha_i + \beta_1 Y_{it} - \beta_2 \tau_{ij} + \beta_3 I_{it} + \beta_4 (C_{ki} * \hat{Y}_{it}) + \beta_5 Z_i + \varepsilon_i \tag{4}$$

The paper employs a panel data model to analyse the relationship between GDP and freight concerning corridors based on India, China, Thailand, Myanmar, Cambodia, Vietnam, and Bangladesh for the period 2010 to 2017. The definitions of variables and their corresponding data sources are given in Appendix 1.

FINDINGS AND ANALYSIS

To find the impacts of specific infrastructure projects on the regional economy at the national level, i.e., how these transport corridors are likely to impact the economic development of the connected countries, this paper has taken four corridors that are expected to connect India with the neighbouring countries. The paper estimated the generalized least squares (GLS) technique as the Hausman test (1978) rejects random effects and the selected fixed effects. GLS also provides a higher R-square compared to Ordinary Least Square (OLS). Therefore, this technique is expected to fit better for our case to find out the potential of the existing freight over the economic corridor with the help of important explanatory variables. The estimated results are presented in Table 3 where only the significant results are reported to examine the estimated relations between the variables concerned.

Table 3 investigates the impact of different economic corridors on freight movement to capture the individual corridor effect in the regression models. Model 1 includes a dummy for the Trilateral Highway, Model 2 includes the Kaladan corridor, and Model 3 and Model 4 include the BCIM –EC and the Mekong India (MIEC), respectively. It is evident from Table 3 that the coefficients of the core variables are robust and consistent in all models. The good fit shows that GDP positively influences the freight of the regions that have a corridor. Further results point out that GDP and road density (a proxy for infrastructure development) are the important determinants of freight flow. The existing Trilateral Highway shows a positive and significant coefficient, thereby suggesting that the countries connecting with the Trilateral Highway are expected to perform better than the countries not having that particular corridor. For every percent increase in GDP, total freight in the region is expected to increase by 0.8 percent over time (see Model 1 in Table 3). The dummy for the Kaladan corridor shows negative and insignificant estimates, whereas the dummy for the BCIM-EC shows negative and

significant results. This can happen when the growth of freight is considerably higher across the countries compared to the corridor connecting countries. For the last corridor of the Mekong India, the dummy shows positive and significant signs suggesting that this will positively influence the countries' freight. The positive and significant relationship between road density and freight implies that the higher the road density, the higher would be the flow of freight between and within the countries. The trade cost has had mixed results.

Table 3: Estimated Results for fixed effect model

Independent Variable	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Log of GDP	0.8** (-2.02)	0.5** (1.5)	0.3* (1.8)	0.4*** (2.8)
Trade Cost	-0.5 (1.2)	-0.1 (2.7)	0.4 (0.5)	-1.1* (1.3)
Log of Road Density	0.3*** (3.1)	0.4*** (2.8)	0.5** (3.6)	0.3*** (2.2)
Log of Speed	0.4 (0.4)	0.7* (0.5)	1.2* (1.1)	0.9** (2.3)
Trilateral Highway	1.2*** (-3.5)	-	-	-
Kaladan Corridor	-	-1.9 (-3.7)	-	-
BCIM-EC	-	-	-1.6** (2.1)	-
Mekong India	-	-	-	1.1* (1.8)
Constant	-1.9 (-0.2)	-1.5 (0.6)	0.8 (-0.7)	0.2 (0.1)
N	35	35	35	35
R^2	0.718	0.802	0.813	0.689
Wald chi^2 (Prob> chi^2)	309.34 (0.00)	534.71 (0.00)	563.39 (0.01)	461.93 (0.00)
Country fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes

*Notes: ***statistical significance at 1%, **statistical significance at 5%, *statistical significance at 10%; parentheses show standard error*

It is evident from the table (Table 3) that GDP has a positive influence on freight. Therefore, an investigation is being conducted to see the contribution of GDP growth in corridor countries compared to non-corridor countries. Table 4 shows the interaction effect of GDP with a dummy for each corridor along with other core variables. The estimated coefficient of GDP shows the expected results. This has come out to be positive and significant in all the models. Again, trade cost comes out to be negative and significant in most of the models. The coefficient of road density has come out to be positive and significant in every model, thereby implying infrastructure is crucial to increase freight movement. The coefficient of speed shows mixed results. The coefficients of the speed without GDP interaction (see Table 3) were mostly positive and significant, although they changed after the interaction (see Table 4, in model 3). This is only possible if there is congestion on the road and traffic hampers the speed of operation.

Interestingly, in terms of GDP interaction, Models 1 to 4 in Table 4 clearly show that the coefficients of corridor countries and GDP interaction variables are positive and statistically significant. The size of the coefficient of the interaction variable with GDP has come out to be greater than that of the coefficient of GDP in non-corridor countries, implying that the countries connected by corridors would gain relatively higher freight compared to others. For instance, the coefficient of the interaction effect of GDP with a dummy for the Trilateral Highway shows that a one-percent rise in GDP growth in the corridor countries would lead to a 0.8-percent rise in freight, compared to non-corridor countries. Similarly, the interaction effect of GDP with the Kaladan corridor, the BCIM-EC, and the Mekong India shows a significantly higher impact on freight movement. Therefore, in the future, after the completion of all corridors, all these countries will have higher freight movement, which is expected to increase economic activity in the entire region.

Table 4: Analysis Results of Corridors with GDP interactions

Independent Variable	Model 1	Model 2	Model 3	Model 4
Log of GDP	0.4* (1.2)	0.3* (0.4)	0.3* (1.4)	0.2* (1.1)
Trade Cost	-1.3*** (4.3)	-0.9** (5.6)	-2.1*** (2.4)	0.8 (1.9)
Log of Road Density	0.4*** (2.9)	0.3*** (3.04)	0.5** (2.9)	0.5*** (2.9)
Log of Speed	1.6** (2.4)	2.3*** (4.4)	-0.2 (0.1)	0.6* (1.6)
Interaction of TH*GDP	0.8*** (2.9)	-	-	-
Interaction of Kaladan*GDP	-	1.4*** (3.4)	-	-
Interaction of BCIM-EC*GDP	-	-	1.3*** (6.1)	-
Interaction of Mekong India*GDP	-	-	-	0.9*** (3.8)
Constant	-38.4*** (0.8)	-21.6*** (6.8)	0.6*** (4.2)	0.4 (0.9)
N	35	35	35	35
R^2	0.818	0.792	0.690	0.634
Wald chi^2 (Prob> $chi^{2)}$	592.81 (0.00)	687.74 (0.00)	713.94 (0.00)	811.49 (0.00)
Country fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes

Notes: ***statistical significance at 1%, **statistical significance at 5%, *statistical significance at 10%; parentheses show standard error.

DISCUSSION

The role of connectivity corridors has been assessed through the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Project (KMTTP), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC). Also, we investigated their impact on

the regional economy at the national level, i.e., how these corridors impact the economic development of the connected areas. The empirical model tried to assess the development impact of the aforesaid corridors on connecting regions with special emphasis on India with the economic geography framework. The aforesaid four corridors are the entry into the international market beyond the eastern borders of the country.

The paper reviewed the overall presence of the transport corridor which connects India with Southeast Asian countries. It considered the existing volume of freight as an independent variable along with GDP, trade costs, and other important infrastructure variables (such as road density and vehicle speed) as independent to understand the relationship between corridor development and the regional economy. The findings from the paper support the view that the building of a corridor can boost the freight movement when there is an increase in GDP. The interaction with GDP in the model shows that GDP growth further stimulates the investment environment for infrastructure development in corridor countries compared to non-corridor countries. The size of the coefficient of the interaction variable with GDP has come out to be greater than that of the coefficient of GDP in non-corridor countries, implying that the countries connected by corridors would gain relatively higher freight compared to others. Therefore, in the future, after the completion of all corridors, all these countries will have higher freight movement, which is expected to increase economic activity in the entire region.

The paper has recognised that countries' GDP is the main determinant for freight. Also, it talked about important determinants like road density (a proxy for infrastructure development). Findings from this paper have shown that there is a positive and significant relationship between road density and freight, which implies that the higher the road density, the higher would be the flow of freight between and within the countries. The paper assessed that the current status of freight along with the current GDP can stimulate economic activities of the region if corridors are operational anytime soon compared to non-corridor countries. Furthermore, the paper focused on India's relationship with Southeast Asian countries and identified the ongoing and upcoming connectivity corridors that are going to increase the freight of this region, which will enhance the economic activities of the whole region.

POLICY IMPLICATIONS

The paper is set to examine the impact of India's initiation of connectivity corridors, like the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Project (KMTTP), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC) on the

regional economy at the national level. The empirical model results show that India is likely to benefit more in terms of freight growth from the Trilateral Highway and the Mekong India, while the impact of the Kaladan corridor and the BCIM-EC remains to be seen. Now, here are some policy implications.

First, the development of the corridor would promote economic activity that, in turn, would enhance inter- and intra-regional trade within and between the participating countries and across the neighbouring countries.

Second, building roads in terms of corridors indirectly influences the infrastructure development of those regions, which would minimise the geographical space and narrow down the economic disparities within the region through reducing transportation costs and time.

Third, better connectivity thereby can enhance the competitiveness of regional, national and international production and consumption activities across the region.

Fourth, regional and national connectivity would help better access to domestic markets and the production process, thereby stimulating further investment, trade, and economic growth in connecting areas.

India and ASEAN have been working together on many integration and cooperation initiatives under the AEP where high importance has been given to these connectivity projects. As analysed here, these corridors are likely to facilitate new economic activities in South and Southeast Asian countries in general and India in particular. Completion of these corridors should be a priority.

CONCLUSIONS

The advantages of better and upgraded connectivity are enormous for both India and its neighbouring countries. This paper has analysed the importance of connectivity corridors. The paper empirically tried to see the impact of corridors, like the Trilateral Highway (TH), the Kaladan Multi-modal Transit Transport Corridor (KMTTC), the Bangladesh–China–India–Myanmar Economic Corridor (BCIM-EC), and the Mekong India Economic Corridor (MIEC) on the economic developments, which are supposed to connect India with the neighbouring countries. Findings suggest that when these international corridors become functional, there will be a boost in the freight movement. The paper has found that GDP and road density are positive and significant, which has a significant impact on freight movement. Countries having corridors will get the benefit of freight with a higher flow of connectivity. For example, with better connectivity, countries can become involved in the regional production network in an open economic framework. Cooperation in the production network would enhance trade and investment, and thereby intensify the Southeast Asian integration process in the future. In the long run, India's connectivity with Southeast Asian countries

would help it to become an economic hub and to unlock the tremendous potential of Asia.

Apart from land and road infrastructure projects, air and maritime connectivity are also critical in deepening linkages between India and Southeast Asian countries. Furthermore, the need for not only physical connectivity but also digital connectivity has been emphasised. India's regional connectivity with Southeast Asia requires the implementation of strong policy initiatives. South and Southeast Asia together form a significant geographic zone in continental Asia. India and ASEAN have been working together on some integration and cooperation initiatives over the years. Therefore, connecting Southeast Asia with India is an important agenda under the ambitious AEP to utilise the economic power and to counterweight the strategic influence of the People's Republic of China. Development and completion of connectivity projects with Southeast Asia will bring significant opportunities for the creation of a functional single market in Asia.

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Appendix 1: Data Sources and Definition

Sl. No.	Variable Name	Description	Sources
1	F (Freight)	Total freight is calculated by aggregating the freight movement via land, air and sea routes in billion tonnes.	(i) Directorate General of Civil Aviation, Ministry of Civil Aviation (ii) Road Transport Year Book, Transport Research Wing, Ministry of Road Transport & Highways, Govt. of India (iii) World Development Indicators
2	Y (Gross Domestic Product)	Gross Domestic Product (GDP) at current prices are taken in US$ million.	(i) Reserve Bank of India (ii) World Development Indicators
3	Trade Cost	Trade cost measures based on aerial distance between India's capital Delhi and respective country capital in km.	(i) Distance data has been collected with the help of the Google Map
4	Road Density	Ratio of total road in km to the total area in square km of that country. Road Density = $\frac{\text{Total available road in km in the respective country}}{\text{Total area in square km in the respective country}}$	(i) Ministry of Road Transport and Highways, Govt. of India (ii) Statistical Year Book India, 2016 (iii) Census of India, 2011
5	Speed	Average speed of the vehicle in km per hour	Based on literature.

INDIJSKA PERSPEKTIVA KORIDORSKIH VEZA SA JUGOISTOČNOM AZIJOM: OD BARIJERE DO MOSTA

Apstrakt: Rasprave o regionalnim ekonomskim integracijama nisu potpune bez rasprava o važnosti povezivanja. Velike mogućnosti i rast, koje je Azija ostvarila u skorašnjem periodu, mogle bi se zaustaviti na međunarodnim granicama azijskih zemalja usled nedostatatka odgovarajuće povezanosti. Stoga je cilj rada da sagleda celokupno prisustvo transportnih koridora koji povezuju Indiju sa zemljama jugoistočne Azije. Otuda kratak pregled iniciranja Indije u povezanost koridora, poput Trilateralnog autoputa (TH), Višemodalnog tranzitnog transportnog projekta Kaladan (KMTTP), Ekonomskog koridora Bangladeš – Kina – Indija – Mijanmar (BCIM-EC) i Mekong – Indija ekonomskog koridora (MIEC). Njihov uticaj na regionalnu ekonomiju na nacionalnom nivou, kao i na ekonomski razvoj povezanih područja, u središtu su ovog rada. Pored toga, pokušavaju se otkriti potencijalne determinante postojećeg tereta koji prelazi preko ekonomskog koridora. Nalazi u radu pokazuju da su BDP i gustina puteva pozitivno povezani sa obimom tereta. Kada ovi koridori budu operativni, povezani regioni će imati više ekonomskih koristi od zemalja koje nisu uključene u koridore.

Ključne reči: povezanost, južna Azija, koridor, rast.

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