COST-BENEFIT ANALYSIS OF COOPERATION IN MOTOR VEHICLE AGREEMENT (MVA)
IN BANGLADESH, BHUTAN, INDIA AND NEPAL REGION (BBIN)

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Benefits and Costs of Making Bangladesh
a Transport Hub in the BBIN Region

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Cost Benefit Analysis of Cooperation in Motor Vehicle Agreement in Bangladesh, Bhutan, India and Nepal Region

Bangladesh Priorities

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Abstract

The economies of the Bangladesh, Bhutan, India and Nepal (BBIN) countries are growing and forging closer economic ties than ever before. Growth and regional integration have been fuelled by several factors, including falling barriers in trade and investment, expanding production networks and supply chains, a commodity boom, and heightened demand from a rising middle class. However, integration in trade, investment, and financial flows between countries of this sub-region, while making progress, has been relatively limited, hindered by various bottlenecks and gaps associated with transport infrastructures. In light of the slowdown in the advanced economies, and the moderation of growth in this sub-region, there is a greater need than ever to expand the size of regional markets through integration. Using cost-benefit analysis, this paper analyzes how improvements in road networks can be beneficial for the region in general and for Bangladesh specifically. It focuses on countries that are physically closest to each other and share common interests in terms of trade and investment. The finding of the paper shows that Bangladesh will reap economic benefits if it allows other countries in the sub-region to use its road networks. In the base case scenario - i.e. with a 2% growth of transit freight traffic per year - both the benefit to cost ratio (BCR) and internal rates of return (IRR) for the Sutarkandi-Benapole road corridor is well above the threshold levels used by the Government of Bangladesh for its investment projects.

Keywords: Motor Vehicle Agreement, Connectivity, Regional Cooperation, Road Links, Trade Facilitation, Benefit Cost Ratio (BCR), Net Present Value (NPV)

Section 1: Introduction[1]

Four kinds of connectivity are critically important for deepening of any regional integration: trade connectivity, transport connectivity, investment connectivity and people to people connectivity. Among these four types of connectivity, transport connectivity is the key to all other forms of connectivity. An integrated and efficient surface transport network is an essential element for enabling economic cooperation at any level, including linkage to any regional or global supply chains[2]. However, until now, South Asia has continued to remain the most disconnected region in the world, with high costs of trading across border and lack of transport cooperation (Prabir, 2015). Bangladesh, Bhutan, India and Nepal (BBIN) constitute a populous, poor and the least networked region in the world (ADB, 2013). As a result, their potential as engines of economic growth at the regional level remains largely unrealized. Basic infrastructure and facilities to establish mutually beneficial intra and inter-regional transport linkages exist in many countries and demonstrate the potential benefits of shared connectivity for the South Asia region. Empirical studies[3] have confirmed that trade costs and infrastructure quality are strongly correlated with trade volumes and gross domestic product (GDP). On the contrary, due to lack of integration of the transport system in South Asia, the logistic costs are very high and range in between 13% to 14% of the value of traded items, compared to only about 8% in the United States of America (Rahmatullah & Yunus, 2010)[4].

Nevertheless, at present, direct movement of goods and passenger transport does not take place among the BBIN countries. Rather, goods are trans-shipped[5] at the border between the respective countries. In order to initiate increased movement of goods and people, among the other initiatives, Motor Vehicles Agreement (MVA)[6] has been introduced as one of the major avenues for fostering regional connectivity. Three MVAs are on the table among the South Asian countries, including BBIN-

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[1] The authors would like to acknowledge the research assistance provided by Mr. Alamgir Hawlader (in the preparation of second draft), Research Associate, IPSS

[2] Although South Asia has been one of the fastest growing economic regions in the world, intra-regional trade is still only 5% of the total trade, as compared to 26% in ASEAN, 52% in NAFTA, and 58% in EU (Rahmatullah & Yunus, 2010).

[3] See the contributions of Limao and Venables (2001), De (2008), Edmonds and Fujimura (2008), Banik and Gilbert (2010), Stone and Strutt (2010), Brooks (2010), and Stone, Strutt, and Hertel (2012).

[4] Rahmatullah, M and Yunus, M. (2010). Costs and Benefits of Cooperation in Transport in SAARC Region, Study was undertaken by Centre for Policy Dialogue (CPD), In collaboration with South Asia Centre for Policy Studies (SACEPS).

[5] Tsunehiro Otsuki, Keiichiro Honda, John S. Wilson, (2013) "Trade facilitation in South Asia", South Asian Journal of Global Business Research, Vol. 2 Iss: 2, pp.172 - 190

[6] http://www.dailypioneer.com/columnists/edit/the-big-bbin-advantage.html (also see box 1)

MVA, which has been signed on June 15, 2015; South Asian Association for Regional Cooperation (SAARC)-MVA; and Bangladesh-India MVA proposal which were mooted by India in September 2011 during the visit of the then Indian Prime Minister to Bangladesh (CPD, 2015).

As mentioned earlier, BBIN countries in the last year (15 June, 2015) have initiated a new chapter in trade and communication by signing the Motor Vehicles Agreement (MVA) 7 among the four countries. Under the framework agreement for MVA (see box-1), all BBIN countries have agreed to conclude formalities related to the operationalization of the MVA agreement by December, 2015 and each party is expected to bear its own costs arising from the implementation of this agreement (CPD, 2015).

Box 1: The motor vehicle agreement (MVA)

Bangladesh, Bhutan, Nepal and India have signed on June 15, 2015. The Agreement seeks to promote cross-border transportation for increased intra and inter-regional trade. Key provisions of the Agreement include:

Vehicles: Cargo and passenger vehicles will be allowed to ply in the territories of the countries, only through authorised operators.

Permit: All vehicles will require a permit for plying through territories of other countries. The permit will be issued by the competent authority of the respective country. The permits will be valid for multiple entries in a year and can be renewed annually.

Documents: Specified documents should be available in the registered vehicles at all times. Such documents include valid registration certificate, certificate of fitness, verified passports of the crew, valid driving license issued by their countries, etc.

Restrictions: Vehicles will not be allowed to ply in the territory of contracting parties where they have not registered. In case of accidents, proceedings against the driver will be carried under laws of the country where the accident occurred.

Fees and charges: All fees and charges for issue of permit for vehicle will be levied at the entry of other country. These rates will be decided and notified from time to time by each contracting party. No additional charges or taxes will be levied other than the charges that are applicable to the vehicles of the destination contracting party.

Source: Monthly Policy Review, PRS Legislative Research, Institute for Policy Research Studies, New Delhi.

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[7] After signing the MVA, it is expected that a vehicle would run through Bhutan-Gowahati-Shilong-SylhetBenapole-Kolkata route to survey the road. The other possible routes are: Thimphu- PhuentsholingJaigaon-Burimari-Mongla/Chittagong, Kathmandu-Kakarvita/Phulbari-BanglabandhaMongla/Chittagong, Samdrup Jonhkar (Bhutan) GuwahariShilongTamabilSylhet-Chittagong, SilcharSutarkandi-Paturia Ferryghat-Benapole/Petrapole-Kolkata, SilcharSaturkandiChittagong Port and Agartola-Akhaura-Chittagong Port.

Under the MVA agreement, 8 routes/corridors have been identified (by four partner countries) for possible cooperation among the BBIN countries:

I.   Possible Bangladesh-India Routes (Kolkata - Petrapole/Benapole-Dhaka - Akhaura/Agartala, Agartala-Akhuara- Chittagong and Silchar - Sutarkandi-Chittagon)

II. Possible Bangladesh-Nepal Routes (Kathmandu-Kakarvita/Phulbari-Banglabandha-Hatikamrul Mongla, Kathmandu Kakarvita/Phulbari-Banglabandha-Hatikamrul Chittagong) and,

III. Possible Bangladesh-Bhutan Routes (Samdrup/Jonkhar-Guwahati-Shilong –Tamabil – Sylhet – Chittagong, Thimpu-Phuentshilong-Jaigaon/Burimari-HatikamrulMongla, Thimpu-PhuentshilongJaigaon/Burimari-Hatikamrul Chittagong).

Although over time all corridors can become seamless transport corridors, identifying the routes which can produce highest benefits with lowest costs and time-effective is very important from the perspective of any country. However, to make them effective and efficient requires a vast series of improvements at a cost of several billion dollars. In this context, it is important to prioritize the corridors in order to ensure optimal use of financial resources. In this paper, we have selected a route from the above three categories for cost-benefit analysis. The selected routes and selection criteria are detailed in section 3 and 4. Though the select routes aim to ease movement of goods and passengers in Bangladesh and other three countries (BIN), the benefits from such movement has been calculated only for uses of roads and other related services like ports from the Bangladesh perspective only.

Accordingly, this current cost-benefit analysis has been undertaken to estimate the gains (in the form of transit fee, freight charges and transaction costs) from developing functional corridors for the transit traffic through Bangladesh as a part of BBIN-MVA and demonstrate the potential benefits from the development perspective of each of these corridors[8]. The understanding of corridors is only concentrated to road links and excludes other modes of connectivity such as rail, ports and others,[9] because the BBIN agreement has been designed to facilitate efficient road transport in the sub-region[10]. Besides, currently, South Asia connects with other Asian countries only by road, and therefore road corridors are reviewed with priority (Gautrin, 2014). This report is primarily based on

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[8] Transport corridors are simply optimal routes from gateway point to gateway point. (IDB, 2011)

[9] Other Studies such as GAUTRIN (2014) analysis the cost and benefit of each corridor separately.
[10] - See more at: http://indianexpress.com/article/india/india-others/sub-regional-road-connectivity-pacts-from-looking-east-to-linking-east/#sthash.7D9PtQh0.dpuf

a seminal study carried out by Rahmatullah and Yunus (2010) on the cost-benefit analysis for a number of routes for these four countries. This paper is organised in six sections. Section 1 introduces present challenges in transport connectivity in the sub-region; Section 2 highlights the costs of non-cooperation and possible gains from the road connectivity; section 3 discusses the underlying methodology used in this paper; section 4 presents the findings from the cost-benefit of the selected road corridors; section 5 highlights the other potential benefits (such as trade creation, employment, etc.) from road connectivity; and section 6 concludes with a relevant policy implications.

Section 2:
Costs of non-cooperation and opportunities for Bangladesh

Before analysing the costs and benefits of the road links among BBIN countries, it is pertinent to know about the costs of not having such links. Prabir *et al*. (2008) found that higher trade transaction costs between each pair of partners lowers bilateral trade between them. They also found that a 10% fall in transaction costs at border has the effect of increasing country's exports by about 3%. This shows that regional transit arrangement could further enhance regional trade. On the other hand, Rahmatullah (2009) argued that without viable transport connectivity amongst the regional partners the benefits of regional cooperation would not be achieved and the costs of all forms of intra-regional or inter-country movement will be very high. However, both of the studies have also mentioned that issues related to regional connectivity and transit cannot be resolved in isolation.

Weak regional transport connectivity between Bangladesh and neighboring countries of India, Nepal, and Bhutan leads to expensive intra-regional trade in terms of both physical and opportunity costs. For instance, it takes more than one and half months for a rail container to reach Dhaka from New Delhi at the cost of USD 2500 per 20 ft container. It follows the route of New Delhi-to-Mumbai-to-Singapore/Colombo-to-Chittagong port and from Chittagong port to Dhaka by rail. If there were direct rail connectivity between Dhaka and New Delhi, then it would take a maximum of 4 to 5 days for the same container to reach the intended destination at the cost of about USD 850. No regional partner can thrive from regional cooperation without engaging in regional transport connectivity. The strong integration of European Union (EU) is sufficient to justify this statement. The apex governing body of the South Asian Countries, specifically, Bangladesh, India, Nepal, and Bhutan should show strong commitment with a set of common interests to initiate the process of implementing regional transport connectivity for greater regional welfare. Rahmatullah (2012) and Prabir (2014) outlined that the frequent shipment of Assam tea to Europe takes 1400 additional kilometers to reach Kolkata's port

through India's "chicken neck" since India has no agreement with Bangladesh to use the shorter route through Chittagong port, which reduces the distance by half.

The distance between Chittagong port and Tripura is 75 km. The shipment of goods from Agratala to Kolkata Port Trust (KPT) through the "chicken neck"[11] covers 1645 km while the traditional route through Chittagong port is only 400 km. Moreover, the transit agreement with Bangladesh can create huge possibilities of international trade for both Nepal and Bhutan. Both countries can use the Mongla port in Bangladesh for shipping their goods and services. India has not allowed this so far, but it is expected that the situation may change as a result of the Joint Communiqué[12]. Countries with common interests should come forward to address the costs and benefits of non-cooperation, and cooperation respectively. Understanding the underlying benefits of cooperation, Bangladesh, India, Nepal, and Bhutan ought to collectively participate in regional transport connectivity for both the national and regional welfare.

Bangladesh is uniquely positioned to take advantage as its transport hub because of its location in the Eastern sub-region of South Asia. Through regional connectivity, it will be a centre point of different initiatives that seek to connect Bangladesh, Bhutan, India and Nepal (BBIN) with the ASEAN and other East Asian countries. With the deeper trade, investment and connectivity linkages within the sub-region, Bangladesh can benefit from new markets, new import sources of high-quality and better-priced products, increasing opportunities for transport and logistics services. Increased trade can contribute directly to investment and job creation, in manufacturing, agriculture as well as services. Understanding the intensity of international trade and commerce, the Government of Bangladesh (GoB) is planning to establish a deep-sea port in the Sonadia Island at the Cox's Bazar district. To become a regional trading hub, Bangladesh needs to understand the tremendous potential of regional connectivity. In addition, Bangladesh also needs to establish necessary infrastructures to facilitate the process and accommodate the benefits of regional connectivity. However, to estimate all benefits accrued from regional connectivity is a colossal task and needs to be done in a elaborate fashion.

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[11] The Siliguri Corridor, or Chicken's Neck, is a narrow stretch of land, located in the Indian state of West Bengal, that connects India's northeastern states to the rest of India, with the countries of Nepal and Bangladesh lying on either side of the corridor. (Rahmatullah, 2010)
[12] http://mea.gov.in/bilateral-documents.htm?dtl/25365/Joint_Statement_on_the_meeting_of_the_Ministers_of_Transport_of_Bangladesh_Bhutan_India_and_Nepal_on_the_Motor_Vehicles_Agreement

If Bangladesh opens its transit system to provide for regional connectivity, it has potential to emerge as a transport hub for the sub-region, which will result in gains for all countries.[13] Therefore, a cost-benefit analysis of transport connectivity[14] will provide a comprehensive picture to operationalize the motor vehicle agreement (MVA).

Section 3: Methodological Issues

Two widely used measures in cost-benefit analysis, the Benefit-Cost Ratio (BCR) and Internal Rate of Return (IRR),[15] will be used in this study. This paper used the BCR and IRR to quantify the net benefits of the interventions under consideration.

BCR is a relative measure that is used to evaluate the payoff of any investment. This measure is calculated by dividing total discounted benefits by total discounted costs as shown in (1).

$$BCR = \frac{\left(\sum_{t=0}^{T}\frac{B_t}{(1+\delta)^t}\right)}{\sum_{t=0}^{T}\frac{C_t}{(1+\delta)^t}} \qquad (1)$$

where, B_t is additional benefits because of the specific intervention in year t; C_t is the additional costs associated with intervention in year t, and δ is the discount rate. Various discount rates have been applied for checking sensitivity analysis of all results.

The internal rate of return is an alternative measure for evaluating the payoff to investments, which has been widely used in the investment literature. The IRR is the rate at which discounted benefits are equal to the discounted cost of investment. In other words, the IRR is the rate of return that would set Net Present Value (NPV) equals zero, as shown in equation (2).

$$0 = \sum_{t=0}^{T}\frac{B_t - C_t}{(1+IRR)^t} + \frac{B_{T+1}}{IRR}\left(\frac{1}{(1+IRR)^{T+1}}\right) \qquad (2)$$

The cost-benefit analysis of transport connectivity is a multifaceted concept. It involves the quality and quantity of infrastructure as well as the economics of different sectors' ability to coordinate with each other. In this study, the benefits have been defined as the earnings from user fees or transit fees for vehicles entering Bangladesh from other BBIN countries.

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[13]The study will help in convincing policy-makers in all four countries - Bangladesh, Bhutan, India, and Nepal. An extended study coving the South Asia region is also being undertaken with ADB support at the next stage.
[14]In this paper, transport connectivity has been used interchangeably with the Motor Vehicle Agreement (MVA).
[15] ADB (2013)

This study has followed the main principles of the paper of Rahmatullah and Yunus (2010). Their study used the benefit-cost ratios of the proposed routes under different scenarios, such as optimistic case (5% cargo growth), pessimistic case (1% cargo growth) and realistic scenario (2% cargo growth). Then using the growth projections of trade and tourism, the flow of vehicles and cargos were estimated to calculate the future benefits. On top of that, this study made an attempt to update the analysis with recent information or by inflation adjustment of costs (investment required for roads improvement, infrastructure to handle and facilitate the movement of vehicles at different borders and beyond the borders and so on) and benefits (user fees, time value of money and so on). Static benefits such as transport efficiency in terms of time and costs, as well as productivity gains, and dynamic benefits such as export enhancement and wage effects were used based on relevant secondary sources.

Possible Benefits to Bangladesh include: (a) Transit Fees for each ton of the cargo from Bhutan, India or Nepal. The country providing the transit facilities should be entitled to charge a "transit fee" when there are large savings in transport costs by moving through the transit country vis-à-vis the original longer route. In the case of North East India (NEI) traffic, Bangladesh, being the transit country, will charge a transit fee for each ton of cargo that will be moving through Bangladesh. The rate for such transit fee is usually related to the savings in transportation costs from existing routes and in most cases the larger share is retained by the country allowing transit for having invested in developing the supporting infrastructure to allow for the additional transit traffic. The remaining share is for the benefit of the country using the transit facility as an incentive to divert traffic. (b) freight charges earned by road transporters. (c) the transaction costs (charges) and charges for other trade facilitation measures at the border crossing. (d) toll charges for major bridges like ongoing Padma Bridge (once completed) could be another source of earnings by Bangladesh Bridge Authority unless, the road transporters include such charges within their freight charges. (e) benefit of a particular corridor is estimated based on the freight charges earned by road transport and transit fee that could be charged. However, Bangladesh's benefits through trade creation (in case of increased trade relations for Bangladesh with India, Nepal and Bhutan) will be based on secondary information (Rahmatullah and Yunus, 2010).

Data Sources: The study has used the secondary data to estimate the cost component. As mentioned earlier, this study is primarily based on an important cost benefit analysis carried by Rahmatullah and Yunus (2010). Other secondary data and information has been collected from the Ministry of Communication, the Ministry of Commerce and the Foreign Ministry, the Government of Bangladesh and from other organizations and online sources.

Section 4: Analysis of Interventions

Rationale for Interventions: Road transport plays an important role in carrying export and import trade between Bangladesh and India. The rationale for selecting a road going through the Benapole border is because nearly 70% of overland trade between Bangladesh and India passes through Benapole/Petropole border point (Rahmatullah, 2009). However, the only road connecting Benapole/Petrapole to Kolkata is merely 5.5 metres wide and highly congested (GoB, 2009). Normally trucks cannot move across the border and all goods need to be transshipped at the border point, which ultimately results in delays and its cost implications. There is no direct truck movement across the border with the North East India (NEI) states either. Goods are transshipped at the border, as in Benapole (Rahmatullah, 2009; Rahmatullah and Yunus, 2010).

In the context of movement of goods between Nepal and Bangladesh, India only allows the use of the Phulbari/Banglabandha route for bilateral trade. Thus, the route cannot be used for third country trade for Nepal. Nepal's export and import traffic uses Kolkata Port Trust (KPT) which is often congested in comparison to Bangladesh seaport of Mongla, which has spare capacity and a direct broad gauge link with Birgunj (Nepal) through Rauxal. India allows trucks from Nepal to operate on designated transit routes within India. Indian trucks are allowed anywhere into Nepal, but are given a limit of 72 hours to return to India (Rahmatullah, 2012). Nepalese trucks need permits for every trip to India with a validity of three months, but they are allowed to travel freely up to the nearest market towns and rail-heads in India. Between Bhutan and India, trucks move freely across the border (ibid).

Table 1: Total Freight Traffic of NE-India, Nepal and Bhutan per year

States/ Countries	International		Domestic		Total Twenty-Foot Equivalent Unit (TEU)		
	Containers	Tons	Containers	Tons	International	Domestic	All
Assam	12,267	1,394,662	10,007	34,330,941	105,245	2,298,737	2,403,982
Nagaland	1,768	201,008	1,442	2,317,791	15,169	155,962	171,130
Tripura	2,328	264,671	1,899	788,516	19,973	54,467	74,440
Other NEI states	3,910	49,684	4,357	1,205,473	36,822	78,248	115,071
Nepal	31,765	858,000	0	0	88,965	0	88,965
Bhutan	0	58,000	0	0	3,867	0	3,867
Total	52,038	3,270,025	17,906	38,542,621	270,040	2,587,414	2,857,454

Source: Rahmatullah and Yunus (2010).

From the table-1, it can be observed that about 38.54 million tons of cargo moved between North East India (NEI) states and the rest of India. Assam alone accounts for about 34.33 million tons[16]. The distant second is Nagaland with 2.32 million tons of cargo. In addition to the cargo freight traffic, about 18 thousand Twenty-Foot Equivalent Unit (TEUs) moved between the NEI states and the rest of India.

For the current study, the cost-benefit analysis has been conducted for three different routes which are:

1. **Bangladesh India route** - Silchar-Sutarkand-Paturia Ferry-Benapole/Petrapole-Kolkata
2. **Bangladesh-Nepal route -** Kathmandu-Kakarvita-Phulbari/Banglabandha-Mongla Port
3. **Bangladesh-Bhutan route** - Thimphu-Phuentsholing/Jaigan-Burimari-Mongla Port

It is important to note that due to the geographical realities all three routes are linked with India (since Bangladesh and India shares borders). The reasons for the selection of these routes are two fold; it will give us a cost-benefit analytical picture for BBIN connectivity as a whole. Furthermore, another study has also identified these three routes as a possible primary connection between these four countries (Gautrin, 2014). The analysis of these principal routes should be taken as a guide for the likely cost-benefit of other routes.

Estimation of Costs: Three broad categories of costs will be incurred: building the BBIN routes, developing access roads, and developing the support services at the borders. According to Gautrin (2014, p. 14) "the net transport cost of a 20-foot container (or a 15-ton loaded truck) would be the ideal cost criterion. Where this is not available, the total distance (in kilometers) from gateway port to gateway port, since fuel consumption and delivery time vary with distance" can be used. Thus estimation of costs is premised upon a number of broad factors namely construction and rehabilitation costs.

Construction/Rehabilitation Costs: At the embryonic stage, opening up borders for transportation freights, Bangladesh has to incur huge costs for installation and upgradation of infrastructure as well as their operations and maintenance (O&M). These costs are individually applicable for each transit corridor. The apportioned capital/investment costs as well as the apportioned O & M costs have been taken into account in the cost benefit analysis. Rahmatullah and Yunus (2010) emphasizes that to

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[16] Though the data is for 2010, however, the relative scenario of freight traffic would remain same.

capture the benefits from diverted traffic from NEI, Bangladesh needs a healthy amount of investment in roads and border-crossing facilities.

Table 2: Capital Costs for the Road Corridors, including Sea and Land Ports

Sutarkandi-Benapole		Banglabandha-Mongla		Burimari-Mongla	
Leg/portion of the corridor	Total Costs	Leg/portion of the corridor	Total Costs	Leg/portion of the corridor	Total Costs
Tamabil-Sylhet	10.97	Banglabandha-Rangpur	3.68	Burimari-Rangpur	24.05
Sylhet-Brahamanbaria	31.00	Burimari-Rangpur	24.05	Rangpur-Hatikumrul	41.60
Brahamanbaria to Dhaka	41.57	Rangpur-Hatikumrul	41.60	Hatikumrul-Mongla	49.32
Dhaka to Nabinagar	8.31	Hatikumrul-Mongla	49.32		
Nabinagar to Paturia	15.01				
Paturia to Benapole	91.80				
Total costs	*198.67*		*118.65*		*114.97*

Source: Rahmatullah and Yunus (2010).

Estimation of Benefits

According to Gautrin (2014, p. 15) "seamless transport corridors would generate microeconomic and macroeconomic benefits, which could be measured using savings in road user costs from a reduction in vehicle operating costs and time savings". For the case of the BBIN, the potentially diverted traffic volumes are presented in the table 3. About 15.64 million tons[17] of inter-state cargo freight traffic would be potentially diverted through Bangladesh (table 3). Of this amount, about 12.02 million tons would be potentially diverted from the state of Assam only. The distant second, worth 2.32 million tons, would be potentially diverted from Nagaland. In addition to the above cargo traffic, about 9 thousand TEUs of inter-state containers would be potentially diverted through Bangladesh. As in the case of cargo, the contribution of Assam is more important in terms of the number of containers originated or destined.

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[17] analysis carried by Rahmatullah and Yunus (2010)

Table 3: Total Potential Diversion of Freight Traffic of NEI, Nepal and Bhutan

States/Countries	International		Domestic		Total (in TEU)		
	TEUs	Tons	TEUs	Tons	Intl	Domestic	All
Assam	4,294	488,132	3,503	12,015,829	36,836	804,558	841,394
Nagaland	1,768	201,008	1,442	2,317,791	15,169	155,962	171,130
Tripura	2,328	264,671	1,899	788,516	19,973	54,467	74,440
Other NEI states	2,457	308,082	2,201	2,564,990	28,476	173,200	201,675
Nepal	15,883	429,000	0	0	44,483	0	44,483
Bhutan	0	58,000	0	0	3,867	0	3,867
Total	26,719	1,749,793	8,808	15,641,649	143,372	1,051,584	1,194,957

Source: Rahmatullah and Yunus (2010).

The possible diversion of freight traffic by corridors has been reported in Table 4. A total of 2.75 million tons of international cargo traffic would be diverted through Bangladesh. Assam will contribute about 0.488 million tons of cargo traffic while Nepal will contribute about 0.429 million tons. In addition, about 26 thousands TEUs of international containers destined to NEI states and Nepal would be potentially diverted through Bangladeshi ports (Chittagong Port and Mongla Port). While NEI states would avail of Chittagong, consigners and consignees from Nepal and Bhutan would likely avail the Mongla due to geographic propinquity.

Table 4: Potential Diversion of Traffic through the selected routes (Tons)

Name corridor	Base (Year 1)	Year 5			Year 15			Year 30		
		1%	2%	5%	1%	2%	5%	1%	2%	5%
Corridor 1: Sutarkandi-Benapole	149,568	157,197	165,135	190,890	173,643	201,298	310,940	201,595	270,921	646,423
Corridor 2: Banglabandha-Mongla	44,483	46,752	49,112	56,772	51,643	59,868	92,476	59,956	80,574	192,251
Corridor 3: Burimari-Mongla	3,867	4,064	4,269	4,935	4,489	5,204	8,039	5,212	7,004	16,712

Source: Rahmatullah and Yunus (2010).

After arriving at the diversion of freight traffic at the base year, growth of freight traffic was estimated at three different scenarios:

I. Realistic growth rate (2 %.)

II. Pessimistic growth rate (1 %.)

III. Optimistic growth rate (5 %)

It was found that diverted freight traffic would be 1.39 TEUs under pessimistic growth, 1.61 TEUs under business as usual growth or realistic case, and 2.48 TEUs under optimistic growth scenarios in year 15. The diverted freight traffic would increase to 1.61, 2.16, 5.17 TEUs respectively in year 30 under the above growth scenarios.

Assumptions:

1. Benchmark traffic flow from Rahmatullah and Yunus (2010) has been updated with the realistic traffic growth rate for year 2015, which has been used as the base year for traffic scenario for this study.

2. Three growth scenarios i.e. pessimistic, realistic and optimistic (1%, 2% and 5%) for diversion of traffic have been projected.

3. Costs for both development of road networks and operation and maintenance have been considered, which has been updated upward with the average inflation rate for last five years (i.e. 7.8%). We have assumed 10% of fixed costs as operating and maintenance costs. Also, we have assumed a 7% inflation rate to adjust the costs estimates for future years.

4. Following the same argument of Rahmatullah and Yunus (2010), we have distributed the fixed costs over five years[18].

5. We have assumed no operation and maintenance cost for the first year.

6. This paper has considered the timeframe of the analysis as 30 years.

7. Note that Banglabandha-Mongla completely subsumes the Burimari-Mongla route. We present results for the standalone route to Bhutan (Burimari), and the route to Nepal (Bnaglabandha) which will capture the Bhutan diversion as well.

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[18]However, we have not considered the costs of developing support infrastructure such as development of port services, boarder facilitation and so on.

Table 5: Results of the Benefits-Costs Analysis for the selected routes (30 years)

Route	Traffic growth scenario	NPV (3%)	NPV (5%)	NPV (10%)	BCR (3%)	BCR (5%)	BCR (10%)	IRR
Sutarkandi-Benapole	1%	1704.45	1311.78	762.54	2.02	1.90	1.65	40%
	2%	1928.69	1466.55	830.37	2.29	2.13	1.79	42%
	5%	3073.62	2254.06	1175.04	3.65	3.27	2.54	56%
Banglabandha-Mongla (includes all of Burimari-Mongla)	1%	550.99	424.05	246.50	1.09	1.03	0.89	6%
	2%	635.58	483.29	273.64	1.26	1.21	0.99	10%
	5%	993.59	728.66	379.85	1.97	1.83	1.37	18%
Burimari-Mongla	1%	44.07	33.92	19.71	0.09	0.09	0.07	n/a
	2%	50.83	38.65	21.89	0.10	0.10	0.08	n/a
	5%	79.47	58.28	30.38	0.16	0.15	0.11	n/a

Source: Authors' estimation based on information from Rahmatullah and Yunus (2010).
Note: a. NPV figures are in Million USD

From the table 5, we can see that the projects are economically viable with quite high rate of economic returns (detail of the analysis is also placed in appendix table 1). Of the three routes, return on investments in Sutarkandi-Benapole will be the highest. However, our estimates of BCR and IRR differ slightly from that of Rahmatullah and Yunus (2010) as we have updated the base year for the analysis and we have used different discount rates. We have found that the BCR is above 1 for the Banglabandha-Mongla route, which is quite consistent with the result of Rahmatullah and Yunus (2010). And this benefit to cost ratio increases when the potential diversion of trade traffic will have an optimistic growth such as 5%. Again, although the Burimari-Mongla is not an economically beneficial investment for Bangladesh, the addition of an extra leg to Banglabandha will unlock traffic diversion through both Nepal and Bhutan.

The IRR also confirms the economic feasibility of the Sutarkandi-Benapole road in any likely scenario of traffic diversion. However, the other two routes generate a higher IRR than the prevailing bank rate only when the yearly traffic growth in these routes are 5%. Rahmatullah and Yunus (2010) in their study (see table 6) also found that the projects are economically viable with quite high rate of economic returns. There are couple of reasons for the differences between the magnitude of the findings of the cost-benefit analysis of the current paper from that of Rahmatullah and Yunus (2010). These include change of base year for the analysis, change of time horizon and use of different discount rates (provided by CCC) than that of Rahmatullah and Yunus (2010).

Table 6: Results of the Benefits-Costs Analysis of Rahmatullah and Yunus (2010)

Corridor	Base case		Traffic Growth		Cost increase	Transit Fee	
	Criterion	Transit Fee 70%	1%	5%	by 10%	60%	80%
Sutarkandi-Benapole	IRR	53.38	51.46	59.06	50.6	51.76	54.93
	BCR	6.67	5.92	9.71	6.06	6.31	7.03
	NPV	261.92	227.22	402.34	257.3	245.4	278.44
Banglabandha-Mongla	IRR	15.73	13.79	21.07	14.02	14.35	17.06
	BCR	1.24	1.1	1.78	1.12	1.14	1.33
	NPV	36.14	15.62	119.09	20.83	22.16	50.12
Burimari-Mongla	IRR	-	-	5.58	-	-	-
	BCR	0.43	0.38	0.62	0.39	0.42	0.44
	NPV	-9.9	-10.72	-6.61	-11.64	-10.02	-9.79

Source: Rahmatullah and Yunus (2010).

The BCR finding is also supported by other analysis[19]. A comparative analysis of costs of road corridors revealed that all the three corridors will be highly cost and time effective to carry transit traffic through Bangladesh (Prabir, 2013; Rahmatullah and Yunus, 2010).

Section 5: Other Potential Benefits of Road connectivity

We mentioned earlier that at the macro level, economic benefits from transport connectivity would be in terms of increases in trade volume and other associated economic activity along the corridor. It is further noted that additional economic benefits would result from the generation of passenger movement and increase in tourism. However, in this study, we did not conduct any standard cost-benefit analysis, rather we attempted to supplement from existing secondary literature. Consequently, this paper has not derived any gross estimation of such benefits.

Better transport and logistics support are the two major preconditions for stronger regional integration[20]. An integrated regional transportation system will reduce the average costs of the movements of goods and services and boost up the trade volume amongst the connected countries (some of this issue has been mentioned in section 2). Better transportation system will also develop environmental safety to reduce the risk of environmental calamities. The removal of transport

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[19] please see GAUTRIN (2014)

[20] Estimates suggest that a 10% fall in transaction costs at border has the effect of increasing a country's exports by about 3% (PRI, 2011).

congestions could potentially reduce air pollution through a more energy efficient transportation logistics system. The cost-benefit analysis in terms of transport connectivity involves the quality and quantity of infrastructure as well as the ability of related sectors to coordinate with each other. With the initiation of regional transport connectivity, there will be multiple positive effects across the economies of BBIN countries. Improvements in transport connectivity within a sub-national region will increase the competitiveness of the economy's exports and imports, and boost investment (Hummels et. al., 2007). Carruthers et al (2003) also argued that improving regional transport connectivity will rapidly foster progress in industrialization. The faster deliveries of goods and services, as well as a reduction in consumer prices, are possible through better transportation logistics. Transport connectivity will provide rural areas access and greater participation in development opportunities that leads to a more balanced spatial development. Adequate logistics access will also promote rural entrepreneurship and trade (UNESCAP, 2008). The empirical evidence seems to strengthen the existing linkage of trade costs and trade flows: the higher the transaction costs between each pair of partners, the less likely they trade. In our case, it is seen that a 10% fall in transaction costs at the border has the effect of increasing country's exports by 3.1% (Prabir, et. al., 2008).

Using general equilibrium model, APEC Policy Support Unit (2009, p. 126) conducted a study to assess the possible gains from amplified productivity of the transport sector in APEC economies. The study showed that the impact of a 10% improvement in the efficiency of transporting goods between the borders of APEC economies would bring in over USD 21 billion (USD 2004) for the region as a whole while Thailand and Vietnam would be the highest gainers. The enhanced productivity has two key effects. First, it lowers the costs of distributing outputs and inputs (thus lowering their prices). Second, it increases income and therefore, increases the demand for goods and services.

Ahmed (2011) estimated the benefits of transport connectivity to the poor districts in Bangladesh. Among the 30 border districts of Bangladesh, some 29 districts are a part of the poor regions in Bangladesh (The only exception is Jessore). Growth and investment in these regions will benefit tremendously from reducing cross-border restrictions on trade, transport and investment (Ahmed, 2011). Since there is no full regional transit in the sub-region, the region might have failed to capture its impact properly (ibid, 43). If barriers to trading with neighbors were removed, intra-regional trade in South Asia could increase from the current USD 28 billion to USD 100 billion (World Bank, 2013). There is great potential for supply chain development in South Asia, whether in textiles, yarn and ready-made garments (RMG), linking production networks in Indian Punjab and western India with Bangladesh, or in the trade of agro-processing linking India, Nepal, Bhutan and Bangladesh. It is to be

noted that the actual impact of MVA agreement, especially agreements whose objectives are to facilitate trade and reduce the costs of doing business across borders will help to reap these potential benefits (Banerjee, 2015). Probir (2013) estimated that other potential benefits can be accrued from enhanced connectivity in terms of income and growth. Detailed estimation is presented in table 7.

Table 7: Effects of South Asian–Southeast Asian Trade Initiatives on Income, Exports, and Exports/GDP in South Asia, 2030

Scenario	SAFTA1	SAFTA2	SAFTA3	SAFTA4	SA/SEA 1	SA/SEA 2	SA/SEA 3	SA/SEA 4
Real Income Gains in 2030 (equivalent variation as % of GDP)								
Bangladesh	0.3	0.8	1.8	5	0.4	1.2	2.5	6.9
India	0.2	0.3	0.5	1	2.3	3.3	4.6	8.7
Nepal	11.9	17	24	44.7	5.4	9.0	14.4	30
Export Gains in 2030 (% change from baseline)								
Bangladesh	15.1	25.8	36.1	67	20	35	48.4	86.7
India	2.6	4.9	6.9	12.7	19.6	29.4	36.7	59.5
Nepal	78.8	136	196	335.3	44.3	88.7	124.2	231.8
Change in Exports/GDP in 2030 (percentage points)								
Bangladesh	3.9	6.7	9	15.4	5.3	9.3	12.2	19.8
India	0.4	0.8	1	1.9	3.8	5.3	6.2	9
Nepal	10.4	18	23.4	36.8	7.5	14.6	19.3	31.6

Note- GDP = gross domestic product; NTB = non-tariff barrier; SA = South Asia; SAFTA = South Asian Free Trade Area; SEA = Southeast Asia. Notes: SAFTA1 = removal of all SA tariffs over 2016–2025; SAFTA2 = SAFTA1 + 50% cut in NTBs; SAFTA3 = SAFTA2 + 5% reduction in trade costs; SAFTA4 = SAFTA2 + 15% reduction in trade costs; SA/SEA1 = removal of all tariffs across SA and SEA over 2016–2025; SA/SEA2 = SA/SEA1 + 50% cut in NTBs; SA/SEA3 = SA/SEA2 + 5% reduction in trade costs relevant to South Asian–Southeast Asian trade; SA/SEA4 = SA/SEA2 + 15% reduction in trade costs relevant to South Asian–Southeast Asian trade.
Source: ADB (2015).

The South Asian FTA scenarios suggest impressive gains for all countries except for the two largest ones, India and Pakistan, that nonetheless experience non-trivial increases in income (1.0% and 3.3% of GDP, respectively, in scenario SAFTA 4) (Table 9.1). Bangladesh, the third largest country, experiences 5% increase in SAFTA4 and 1.8% increase in SAFTA3. In the case of Bangladesh, SAFTA4 will increase 15.4% of its exports by 2030. The smaller South Asian economies of Nepal and other South Asia are by far the biggest winners in the context of a South Asian FTA, with large gains of over 40% in SAFTA4. South Asia in total experiences a rise in its real income by 2.1% of GDP by 2030 under that scenario, and increase in exports of 25.2%. This suggests that focusing on reducing trade costs is a key to welfare improvement in the context of South Asian economic integration.

Table 8: Changes in Factor Prices in Bangladesh, 2030 (% change relative to baseline)

Scenario	SAFTA1	SAFTA2	SAFTA13	SAFTA4	SA/SEA1	SA/SEA2	SA/SEA3	SA/SEA4
Bangladesh								
Wage	0.5	1.3	2.3	6	0.6	1.6	2.9	7.5
Land rental price	1.1	2	3.6	8.7	1	3.1	5.5	13.4

Note- GDP = gross domestic product; NTB = non-tariff barrier; SA = South Asia; SAFTA = South Asian Free Trade Area; SEA = Southeast Asia. Notes: SAFTA1 = removal of all SA tariffs over 2016–2025; SAFTA2 = SAFTA1 + 50% cut in NTBs; SAFTA3 = SAFTA2 + 5% reduction in trade costs; SAFTA4 = SAFTA2 + 15% reduction in trade costs; SA/SEA1 = removal of all tariffs across SA and SEA over 2016–2025; SA/SEA2 = SA/SEA1 + 50% cut in NTBs; SA/SEA3 = SA/SEA2 + 5% reduction in trade costs relevant to South Asian–Southeast Asian trade; SA/SEA4 = SA/SEA2 + 15% reduction in trade costs relevant to South Asian–Southeast Asian trade.
Source: ADB (2015).

Table 8 shows the changes in factor prices associated with policy innovations at the country level, as a means of gauging the distributional effects. Nominal and real wages rise in all scenarios for Bangladesh, assisted in most cases by a drop in prices (measured either as the GDP deflator or the consumer price index), with the exception of India, whose real wage nevertheless still increases. The gains to labour relative to other factors (capital, land) are mixed. For example, in India, labour always gains relative to landowners but not always relative to capital owners while in Bangladesh, labour often gains relative to capital owners but not to land owners. In Nepal, labour does worse than capital and land in the South Asian FTA scenarios but always does better than landowners in the South Asian–Southeast Asian FTA scenarios.

Table 9: Export Potential in Bangladesh

(Million USD)

Partner	Actual Export	Potential Export	Potential Export	P/A	UE
	2010 (A)	2010(P)	2017(P)	2010	2010
Afghanistan	7.36	9.436	12.818	1.282	21.999
Bhutan	7.406	11.048	14.101	1.492	32.97
India	320.9	1854.256	3540.681	5.778	82.694
Maldives	1.76	1.14	2.38	0.648	-54.386
Nepal	9.81	14.255	89.499	1.453	31.184
Pakistan	68.64	192.846	476.662	2.81	64.407
Sri Lanka	12.03	29.724	93.664	2.471	59.528
South Asia Total	427.906	2112.706	4229.804	4.937	79.746

Source: De Prabir(2013)

Table 9 indicates that in South Asia, India is the main trading partner of Bangladesh. However, there is a huge trade deficit with India. In 2010, potential exports were 1854.254 million USD but actual exports were only one-sixth of that - 320 million USD. In 2010, potential exports to the overall South Asia were 2112.706 million USD but real exports were only 427.906 million USD. Overall actual exports

were four-fold lower than potential exports. Therefore, secondary sources endorse the positive linkages between enhanced transport connectivity and increased trade.

Contribution to the GDP:

Based on the potential benefits calculated for these three routes, the paper has attempted to estimate its likely contribution on the country's GDP for next 30 years. For this exercise, we have added the net present value (NPV) of potential benefits from traffic diversion under different scenarios to get the total benefits. Then, we have adjusted the GDP figures with the annual GDP growth rates to project future GDP. Finally, we have taken the share of the potential benefits of these three routes to the projected GDP figures for next 30 years, which has been presented in the following table. In the current economic scenario, operationalization of these three routes might contribute 0.06% of the total GDP. The importance of these routes might decease over time, unless the diversion of traffic growth maintains a high growth rate of 5% per year.

Table 10: Potential effects of these three routes on gross domestic product for Bangladesh
(Share of GDP)

Year	Traffic growth scenario			Year	Traffic growth scenario		
	1%	2%	5%		1%	2%	5%
0	0	0	0	15	0.03	0.03	0.05
1	0.06	0.06	0.06	16	0.03	0.03	0.05
2	0.06	0.06	0.06	17	0.03	0.03	0.05
3	0.05	0.06	0.06	18	0.03	0.03	0.05
4	0.05	0.05	0.06	19	0.02	0.03	0.05
5	0.05	0.05	0.06	20	0.02	0.03	0.05
6	0.05	0.05	0.06	21	0.02	0.03	0.05
7	0.04	0.05	0.06	22	0.02	0.03	0.05
8	0.04	0.05	0.06	23	0.02	0.03	0.05
9	0.04	0.04	0.06	24	0.02	0.02	0.05
10	0.04	0.04	0.06	25	0.02	0.02	0.05
11	0.04	0.04	0.06	26	0.02	0.02	0.05
12	0.03	0.04	0.06	27	0.02	0.02	0.05
13	0.03	0.04	0.06	28	0.02	0.02	0.05
14	0.03	0.04	0.06	29	0.01	0.02	0.05

Source: Authors' estimation

Section 6: Policy Suggestions and Conclusions

From the perspective of Bangladesh, two direct tangible benefits in the current analysis include (i) freight charges for the segment of the concerned transport network falling within Bangladesh and (ii)

transit fees taken as 70% of the transport cost savings due to traffic diversion for each route. This paper has not taken into consideration other benefits such as port user fees, border fees, and tolls at bridges. The paper focuses on estimating the benefits from uses of road links only. Calculations of other areas of benefits would likely increase the overall benefits.

The cost-benefit analysis (CBA) reveals high returns compared to the investments required from Bangladesh for the projects. In the base case scenario (assuming the realistic case of 2% growth of transit freight traffic per year), both the benefit to cost ratio (BCR) and internal rates of return (IRR) for the main road corridor (Sutarkandi-Benapole) are well above the threshold levels used by the Government of Bangladesh. The Banglabandha-Mongla route, while less beneficial, still passes the threshold of 1 at the 5% rate. The Burimari-Mongla route is not cost-beneficial as a standalone route (though as stated, the Banglabandha-Mongla route subsumes it completely). These results support that trade in transport services are an economically viable option for Bangladesh. However, we need to keep in mind that our current analysis follows static timeframe for calculating the costs and benefits, and does not[21] consider calculating the long-term dynamic benefits of increased trade such as job creation, increased productivity and investment.

This study is an attempt to fill in the gap and estimate in financial terms the benefits and costs for Bangladesh to transit movement of goods and people from its neighbouring countries through its territory. The findings of this study have demonstrated the extent of gains for Bangladesh and underline the win-win situation for all the parties involved. Hence, the study lays a strong case for promoting regional transport connectivity targeting the seamless movement of goods and people across Bangladesh. It is expected to further expedite the implementation of the process and procedure to operationalize the initiative both from the policy makers and stakeholders' perspective from the region. This study can potentially compliment the Sixth Five Year Plan (2011–2015) and the Ten Year Perspective Plan (2011–2020) where effective regional connectivity and better trade facilitation are being given prominence.[22]

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[21] although from the secondary sources, this paper revved such dynamic benefit which has been presented in section 5

[22] Planning Commission 2011; Srinivasan 2012

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Appendix 1

Appendix Table 1: Benefit-Cost Analysis of the Proposed Road Routes/Interventions

| Intervention/Routes	Traffic Growth scenario	3% discount rate			5% discount rate			10% discount rate		
		Benefit	Cost	BCR	Benefit	Cost	BCR	Benefit	Cost	BCR
Sutarkandi-Benapole	1%	1704.45	842.60	2.02	1311.78	688.90	1.90	762.54	462.72	1.65
	2%	1928.69	842.60	2.29	1466.55	688.90	2.13	830.37	462.72	1.79
	5%	3073.62	842.60	3.65	2254.06	688.90	3.27	1175.04	462.72	2.54
Banglabandha-Mongla (includes all of Burimari-Mongla)	1%	550.99	503.21	1.09	424.05	411.42	1.03	246.50	276.34	0.89
	2%	635.58	503.21	1.26	483.29	411.42	1.21	273.64	276.34	0.99
	5%	993.59	503.21	1.97	728.66	411.42	1.83	379.85	276.34	1.37
Burimari-Mongla	1%	44.07	487.60	0.09	33.92	398.66	0.09	19.71	267.77	0.07
	2%	50.83	487.60	0.10	38.65	398.66	0.10	21.89	267.77	0.08
	5%	79.47	487.60	0.16	58.28	398.66	0.15	30.38	267.77	0.11

Source: Authors' estimation based on information from Rahmatullah and Yunus (2010).
Note: Benefits figures are in Million USD

Annex-1

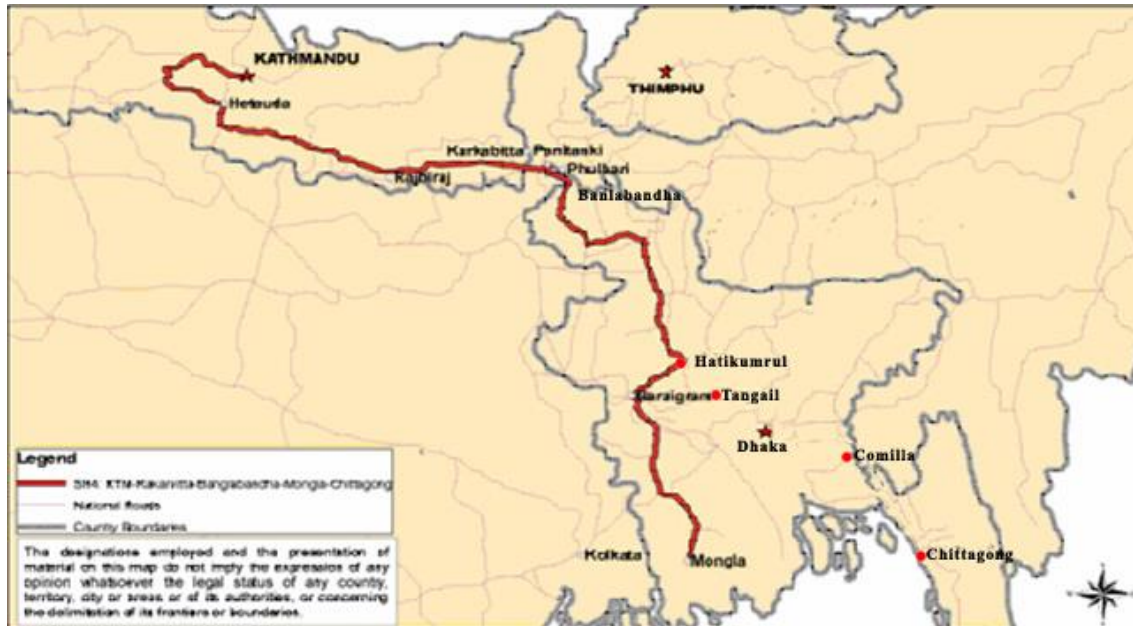**Map 1: Road Corridor (Corridor: Sutarkandi-Benapole)**

Silchar-Sutarkand-Paturia Ferry-Benapole/Petrapole-Kolkata
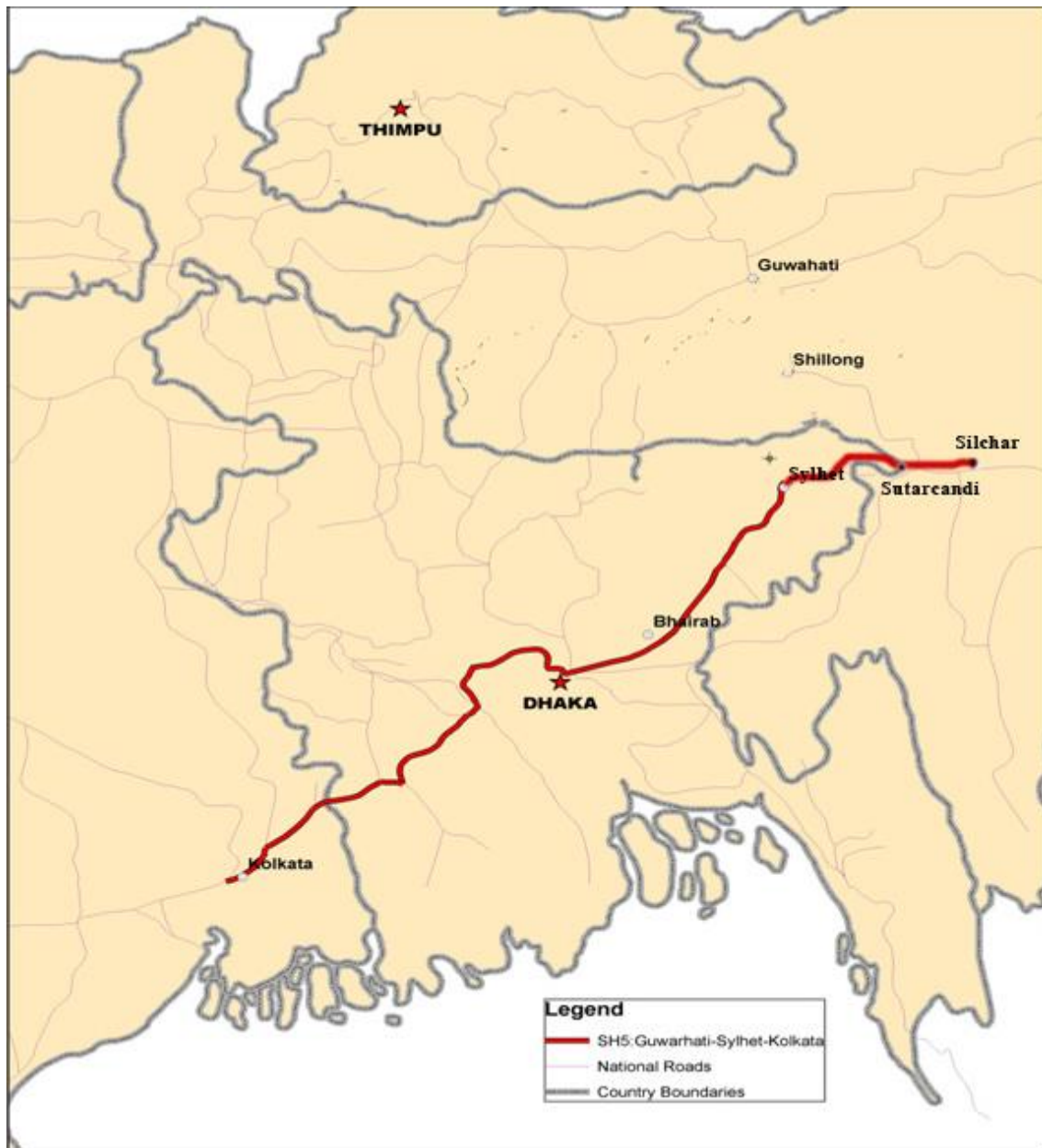
Annex 2

Map 2: Road Corridor

Kathmandu-Kakarvita-Phulbari/Banglabandha-Mongla Port

Annex 3

Map 3: Road Corridor

Thimphu-Phuentsholing/Jaigan-Burimari-Mongla Port

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