



# Costs and Benefits of Regional Connectivity: An Analysis from Bangladesh Perspective

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aims:** This paper aims to investigate the costs and benefits of regional connectivity in Bangladesh from the economic perspective through using the analytical tools of benefit-cost analysis.

**Study design:** The study is conducted based on forecasted secondary data from different related published sources. A qualitative stakeholder survey is conducted to evaluate the intended impact of regional connectivity on the economy of Bangladesh.

**Methodology:** The study uses qualitative research tools to assess the impact of bilateral or multilateral connectivity and uses the tools of benefits-costs analysis (NPV, BCR, and IRR) applied to evaluate the effectiveness of regional connectivity from bilateral and multilateral perspectives. Our key hypothesis is that 'regional connectivity improves benefits'.

**Results:** The study shows that Bangladesh can gain from connectivity. However, gains from regional connectivity, especially, bilateral connectivity is very sensitive to the changes in the variables particularly, transshipment charge, volume of transshipment, and cost of building physical

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infrastructure. With modest values of the parameters, we find that connectivity generates a positive net present value, if Bangladesh can charge rationally against the cost of building infrastructure. From the stakeholders' point, connectivity is beneficial, particularly multilateral connectivity generates more net benefit than the bilateral connectivity. Besides, the economic costs, the security concern can play a big effect on the social cost of such connectivity. Meanwhile, grave concern is aired on incurring a huge project cost, if Bangladesh implements the project with a higher interest rate loan from India. Moreover, the imposition of congestion fees, water pollution, and traffic fees derive the benefit from transit facilities.

**Conclusion:** The net gains from regional connectivity depend on trading patterns' transshipment of goods, trade creation, and trade diversion among the partners through the connectivity process. Bangladesh needs to adopt gains-optimizing strategies for fixing the direct and indirect fees. Bangladesh should prioritize the silk-route connectivity more than the Asian Highway to attract FDI and sunset industry from China.

**Keywords:** Economic connectivity, net present value (NPV), internal rate of return (IRR), volume of transshipment, connectivity fees, trade diversion.

## ACRONYMS AND ABBREVIATIONS

BBIN	: Bangladesh-Bhutan-India and Nepal
BCIM	: Bangladesh-China-India-Myanmar
CCT	: Core Committee on Transit and Transshipment
FINER	: Federation of Industries of North Eastern Region
ITW	: Inland Water Terminal
NCT	: New-mooring Container Handling Terminal
NER	: North Eastern Region of India
SAFTA	: South Asian Free Trade Agreement
SAPTA	: South Asian Preferential Trade Agreement

## 1. INTRODUCTION

The integrated transport infrastructure that South Asia inherited from the British Empire was disrupted by the partition of the Indian subcontinent. This infrastructural deficit has increased transportation costs for any trade in this region; leading to an increase in the region's doing business [1]. Moreover, the lack of multilateral regional connectivity or silk route for trade has been identified as one of the critical factors, limiting South Asia in achieving its full trade potential. Before the partition of the subcontinent, goods from Assam to West Bengal were carried through the waterways of Bangladesh, and during the Pakistan period, three routes were given under the Inland Water Connectivity and Trade protocol [2] for trade in the NER. The old Protocol was revived on 28 March 1972 allowing transportation of goods on 4 routes. Presumably, a major portion of goods, not all, currently transported from Western parts

of India through Shiliguri by road and railway will be connected through Bangladesh.

Being ranked as the 33rd largest economy in the world<sup>1</sup>, Bangladesh has been experiencing a trade imbalance (either high export or high import) with most of its trading partners, especially with India. The trade deficit with India has been increasing every year. After the successful adoption of SAPTA and its elevation into SAFTA in July 2006, South Asian countries were expected to integrate further. However, the region remained to be the least integrated trade area<sup>2</sup>. At present, Bangladesh imports nearly US\$7.79 billion per year from India, which is around 18.1% of total goods imports of Bangladesh in FY2021-22. In return, Bangladesh's exports to India are around US\$1.99 billion, which is only 3.58% of Bangladesh's total exports in FY 2022-23. Given this fact, South Asian countries are now looking toward deeper integration of the region. However, how much such an integration like BBIN and beyond South Asia like the BCIM and Silk Route would contribute to reducing Bangladesh's trade deficit should be examined further.

Regarding this issue, this paper has attempted to analyze the effect of regional connectivity on the basis of regional trade and the economic benefits of Bangladesh. The position of Bangladesh is different from its regional peers as she can become a communication hub both for South

<sup>1</sup> Ranking of Bangladesh in World economy, IMF, 2015 in terms of PPP

<sup>2</sup> Intra-regional trade among South Asian countries is only 6% of the region's total trade.

Asia and South East Asia due to the presence of the Chittagong and Mongla ports along with its future seaports (Shonadia, Payra, and Matarbari). Similarly, BCIM in a concerted manner can open worldwide connectivity through the revival of the ancient silk route, exerting benefits from the communication with the North Eastern Region (NER) of India. For instance, connectivity facilities through Bangladesh may on average reduce the 1000 km distance for Indian traders to transport their goods from the mainland of India to the NER. In this context, negotiating the connectivity-related charges will be a critical issue to ensure the extent of mutual benefits. Optimum charges for connectivity must be determined based on reciprocity and marginal trade benefits anticipated by the parties involved. Therefore, in exchange for opening the corridor of BBIN and the connectivity with the NER along with huge infrastructure costs, benefits should be considered in favor of Bangladesh.

Bangladesh's trade deficit with India stands at US\$11.70 billion while the merchandise export of Bangladesh is US\$105.5 million in Nepal and US\$22.12 million in Bhutan in FY2022-23<sup>3</sup>. If the envisaged trade diversion happens, the installed infrastructure cost would become an extra burden for an emerging low-middle-income country like Bangladesh. Though US\$2 billion credit from India is now available, of which a significant portion is already approved, the extent of benefits of Bangladesh depends on its negotiation capacity related to the concessional form of financing.

Given a sizeable bilateral trade with China, implying 11.62%<sup>4</sup> of Bangladesh trade, the silk route potentiality can increase the trade, regional cooperation related to the energy grid, and its regional distribution under the BCIM framework. The trade volume between China and southeast countries is relatively high in comparison to other developed economies. Moreover, Bangladesh is in a favorable position to grasp the technology-transfer opportunity from China and can easily find new markets in countries of the Silk Route area that would boost domestic exports.

Bhuyah [3] identified that possible routes for the connectivity of Indian goods are highly occupied and at present, about 750 trucks are moving every day on average. The annual traffic for

carrying 8 million MT of goods in a year would require roughly 1500 trucks with a capacity of 15 MT for each one. Total vehicular traffic in these routes would be 2250 trucks per day including domestic traffic of 750 trucks, which is 3 times higher compared to current traffic. When the traffic would be doubled, the cost of maintenance would go up by about 30-42%. Therefore, the subsequent increase in connectivity traffic would entail increased maintenance and rehabilitation works.

The objectives of the study are to examine whether the proposed charges for bilateral connectivity between Bangladesh and India are beneficial as well as to evaluate whether the benefits of multilateral connectivity will be higher than that of bilateral. Moreover, it will explore whether bilateral connectivity creates trade creation or multilateral connectivity causes more trade creation.

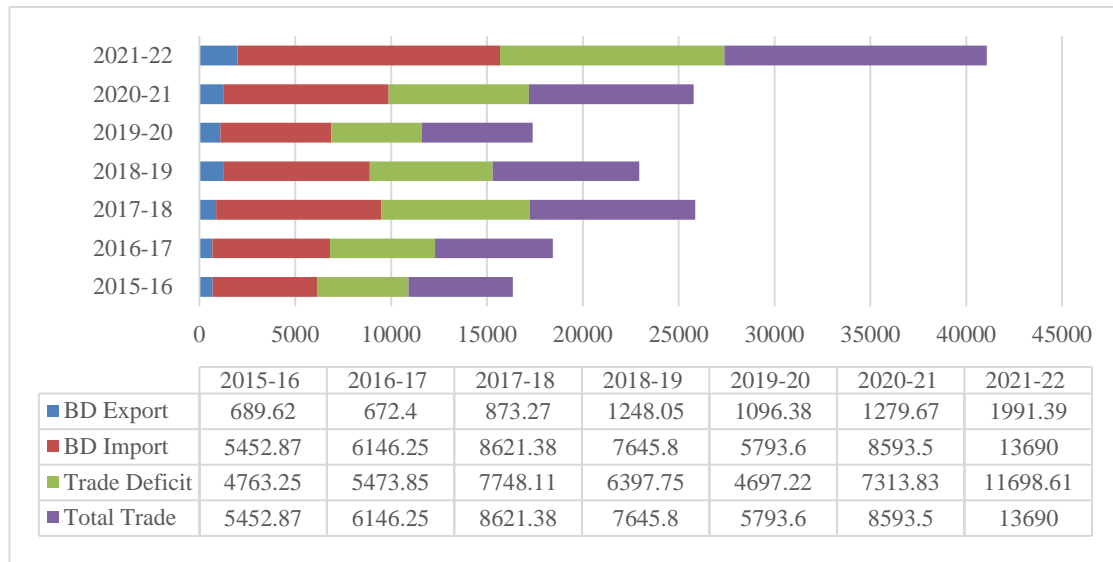
The article sets the hypothesis that Bangladesh will benefit by giving transit and transshipment facilities to other countries if it gets higher charges than the cost of building infrastructure. The country can be benefited, if its export opportunities are created or trade creation expands through transit facilities provided by Bangladesh. If the charges and trade creation fail to meet the expected level, Bangladesh cannot derive benefits from multilateral connectivity on the one hand. On the other, if trade is created through multilateral connectivity, implying that the Bangladesh export increase in Nepal, Bhutan, and Myanmar, Bangladesh derived profit from the connectivity infrastructure.

## 2. LITERATURE REVIEW

The dominance of regional connectivity in trade and investment is remarkable because it avoids transaction costs and delays. The BBIN countries—Bangladesh, Bhutan, India, and Nepal—have an increasing number of connectivity agreements, which point to advancements in regional transportation and trade facilitation. Even if intra-BBIN trade increased from US\$3 billion in 2005 to over US\$18 billion in 2019, there is still significant room for growth. If Bangladesh and India sign a free trade agreement, the World Bank predicts that Bangladeshi exports to India might increase by 182% and India's exports to Bangladesh by 126% Yunus [4].

<sup>3</sup> Export Processing Bureau of Bangladesh 2021-22 & Bangladesh Bank Import Statics 2022

<sup>4</sup> World Bank Report 2015



**Fig. 1. Bilateral Trade between India & Bangladesh in US\$ million**

Source: Adapted from EPB Export Data 2021-22 and Bangladesh Bank Import Statics 2021-22

**Table 1. Possible routes for connectivity**

Routes	Distance	Remark
Benapole – Tamabil	686	Via Dhaka. May serve all states except Tripura and Mizoram.
Benapole – Akhaura	437	Useful for Tripura, Mizoram, Manipur, and Nagaland.
Hili – Tamabil	650	Can serve all Eastern and NE states equally well.
Hili – Akhaura	404	
Banglabandh – Tamabil-	876	The longest distance between the Western, and Eastern border
Banglabandh – Akhaura	627	
Rohanpur – Tamabil	763	May serve all Eastern & NE states well.
Rohanpur – Akhaura	416	-do-

Source: Professor A. R. Bhuyan, *Allowing Connectivity Facility to India*

In the face of escalated transport costs in the eastern region, at present, India is seeking a corridor through Bangladesh that would on average reduce 1500km distance for Indian traders to trade from the mainland of India to the Northeast of India. Bhuyan [3], about a decade ago, showed that transport cost in medium trucks (15.6 tons) per ton per km from Kolkata to NE states was Rs. 0.25 by water, Rs. 0.85 by rail, and Rs. 1.57 by roads (in BDT, 0.30, 1.02, 1.88, respectively). The transport cost per ton/km inland routes through Bangladesh was BDT 1.19, which was 37% lower than the cost of transport through Shiliguri. These costs include only trafficking costs (freight, toll, fees, and ancillary charges) but do not include other costs; for instance, insurance, loading-unloading, fuel costs, lubricants, spare parts, and repairs. Indian

traders can save 37% of the costs if the goods are transported through Bangladesh and there would be also a significant saving in turnaround time. The length of convenient routes varies from roughly 400 km to 690 km through Bangladesh. As Bangladesh has a common border with Assam, Meghalaya, Mizoram, and Tripura, shipment destinations are not far away from exit points in its Eastern borders. Similarly, the states like Monipur, and Nagaland, except Arunachal Pradesh, are in the proximity of 100 km. On the other hand, goods flowing through Shiliguri have to travel more than 500 km after the Shiliguri corridor. Rahman et al. [5] stated that India would benefit through reduced transport costs and time to reach destinations in North-East states, but the estimation of the number of vehicles and volume of goods moving along the eight possible

routes. Every year, 120 million tons of goods are transported from West to East India. A container usually takes 20-25 days and occasionally even up to 60 days to move from New Delhi to Dhaka, as the maritime route stretches from Bombay to Singapore/ Colombo to Chittagong Port and then Chittagong to Dhaka by railway. However, it can reach Dhaka within 3-4 days, if there is a direct rail connectivity from New Delhi to Dhaka. The Core Committee on Transit and Transshipment (CCT) in its final report stated that Indian businesses would be highly benefited through savings of both transport cost and time if a connectivity facility is granted by Bangladesh. However, the CCT report 2015, has also recommended that Bangladesh will face some financial risks if the required amount of investment for connectivity-related infrastructure is made from its domestic budgetary resources. In this reference, Yunus [4] recommended that Bangladesh has to initiate the first-round project costing US\$1.8 billion for the construction of preliminary infrastructures.

Yunus [6] urged that, in absolute terms, the maintenance cost could be about BDT 350 to 400 million each year for the routes likely to be used for connectivity. To avoid congestion at Dhaka city, through which nearly all connectivity traffic passes, the 50 km Gazipur-Narsingdi Feeder Road should be upgraded (likely cost of BDT. 1500 million) and a new Tangail-Bhairab by-pass road stretching over 150 km should also be constructed (likely cost of BDT 9000 million). Similarly, he estimated that ITW facilities are supposed to halve the cost of transportation from Kolkata to Agartala. The cost of transportation through this route was estimated to be US\$50.08 per ton while the cost of through the IWT corridor was estimated to be US\$25.61 per ton reflecting a reduced cost. According to the CCT report, around BDT 48,000 crore is required in the next 10 years for the connectivity-related infrastructure development and BDT 29,223 crore would be needed only for the development of rail routes and investment of almost BDT 11,942 crore would be for the development of roads. Also, according to the CCT Report, BDT 201crore and BDT 1,161 crore would be needed for the development of land ports and for dredging and maintaining shipping routes respectively. The estimated cost of strengthening the handling capacity in Chittagong port would be BDT 1,709 crore (CCT report) [7].

Similarly, Mohsin [8] mentioned that the New-mooring Container Handling Terminal (NCT) with

a manpower of 1,343 people was installed at Chittagong port in 1999 to accommodate Indian containers. With the establishment of the NCT, the port is expected to handle 1.5 million containers annually and earn 200 million taka per year. It was approved by the ECNEC on 12 May 1999. In the proposal, the cost of building the infrastructure was estimated to be BDT 458 million along with capital instruments costing BDT 252 million. Besides, the construction of the NCT Jetty at the Chittagong port with a cost of BDT 737 million was started in 2004 and completed in 2007. However, even after eight years, the NCT remained idle till 2015 when the inland water-way connectivity treaty kicked off and in March 2016 the terminal was again opened. The NCT terminal was built with the revenue of Bangladesh but Bangladesh businesspersons were deprived of using the NCT.

Given the fact that for providing connectivity through the inland waterway, Ahsan [9] said that BDT 2,798 crore is needed for dredging and infrastructure development of the Mongla port only. Meanwhile, the negotiation has started because of the BBIN-MVA for allowing India to use the Chittagong and Mongla ports. However, a more comprehensive approach is needed concerning user/service charges considering both current and future trends. Any piecemeal, discrete, or arbitrary fixation of rates will undermine Bangladesh's economic benefit. Besides, a clear roadmap in this context will also encourage to undertaking of policy measures. Given this fact, Rahman & Bari [10] mentioned, that if all facilities were put in place as per the core committee recommendations, the transshipment fee would be increased by US\$13.4 and US\$19.3 per ton respectively. Before this new arrangement came into operation, Mohsin mentioned that goods transshipped through waterways would give Bangladesh BDT10 crore annually, with no additional transshipment or connectivity fees. As connectivity has been extended to roads and railways, the question of connectivity fees has come to the fore.

The Accelerating Transport and Trade Connectivity in Eastern South Asia (ACCESS) Phase-1 Program has received a \$1.03 billion grant from the World Bank. Through this effort, manual trade processes in Bangladesh and Nepal would be replaced with digital ones. This change will result in electronic truck tracking, queue reduction, faster border

crossings, and intelligent parking. According to the Environmental and Social Management Framework (2022), Bangladesh's 43-kilometer-long Sylhet-Charkai-Sheola road will be upgraded into a climate-resilient four-lane road as part of the \$753.45 million ACCESS Project. Travel time will be slashed by 30% thanks to this road's connection between the Sheola Land Port and the Dhaka-Sylhet Highway. Benapole, Bhomra, and Burimari, which handle around 80% of land-based trade, are Bangladesh's mainland ports, and the effort will also improve their digital systems, infrastructure, and efficiency there. It will also update Chattogram's customs office, which oversees 90% of imports and exports. Even though trade between Bangladesh, Bhutan, India, and Nepal increased by six times between 2015 and 2019, there is still a sizable untapped market. With process automation supporting resilience against emergencies like the COVID-19 outbreak, this project is anticipated to increase regional trade and transportation in Bangladesh. It is expected to develop effective and dependable regional commerce and transport in the BBIN countries is the goal of the proposed World Bank-financed BBIN Regional Transport and Commerce Facilitation Program.

Quium [11] preferred Trans-Asian Railway and Asian Highway networks to transit as it would connect the majority of Asian nations, while maritime services would connect coastal nations and tiny island Developing States. By encouraging international trade, foreign direct investments, and the development of both global and regional production networks, these ties have fueled the region's economic progress. With the help of these modernized systems, nations have been able to diversify their economies, reduce their reliance on established industries like agriculture, and create jobs, particularly in labor-intensive areas like apparel and electronics.

Majumder, Rahman, and Martial [12] demonstrated that Bangladesh's current infrastructure is comparatively weaker than that of its neighbors, making it unable to draw foreign direct investment. By improving infrastructure, logistics, and trade facilitation, attracting foreign direct investments (FDI) will increase its competitiveness [13]. In general, Bangladesh's infrastructure is of lower quality than that of its regional rivals, including India, Pakistan, and Sri

Lanka. Bangladesh was ranked 132 in adult Internet Users (% Population), 108 in Quality of Roads, and 114 in Overall Quality of Infrastructure out of 141 countries. However, Bangladesh outperforms its regional peers in electricity supply quality and ranks 68 [14].

Rahmatullah [1] explored how Bangladesh's trade potential will increase if it can improve relations with its neighbors, particularly India and Myanmar, and handle any unresolved issues such as border disputes, water sharing, and the Rohingya situation. He further argued that the sub-region's peace and stability will be enhanced by fostering more regional collaboration and economic integration.

Certain Asian and Pacific nations have made considerable progress in expanding their road networks, adding around 300,000 kilometers of roads each year for the past decade [15]. According to ESCAP, updating the Asian Highway Network is likely to cost around \$36 billion, although the maintenance expenses for the current network are anticipated to be comparable to those for building new infrastructure. For long routes (usually over 500 km), freight railways are more affordable than road transportation, and they are still competitive for medium distances (300–500 km), especially for heavy industries and significant annual transport volumes. In addition, rail transportation emits four times as little carbon dioxide as inland waterways barges and eight times less than vehicles [16].

Kaul [17] argued that the transit time between India and Bangladesh should be 138 hours on average, plus an additional 28 hours for loading and transporting freight. In contrast to other regions, East Africa, handle comparable traffic in less than six hours. In this sub-region's land ports, border transit times are frequently lengthy and unpredictable due to capacity imbalances. For instance, the maximum capacity of Bangladesh's Benapole Land Port is matched by India's Petrapole Integrated Check Post, which can take 750 export trucks but only processes 370. He therefore emphasized the need to improve the port management system's effectiveness to boost trade between India and Bangladesh. Hence, he stressed strengthening the efficiency of the port management system to increase the trade volume between India and Bangladesh.

**Table 2. Overall quality of infrastructure in Bangladesh**

Country	Overall Quality (infrastructure)		Quality of Road (infrastructure)		Efficiency of Sea Port Services		Electricity Supply Quality		Internet User % adult Population	
	Score	Rank out of 141	Score	Rank out of 141	Score	Rank out of 141	Score	Rank out of 141	Score	Rank out of 141
Bangladesh	51.1	114	37	108	42.2	92	93.1	68	15	132
India	68.1	70	58.6	48	59.1	49	58.8	108	34.5	107
Pakistan	55.6	105	50.7	67	52.9	70	87.9	99	15.5	131
Sri-Lanka	69.2	61	48.9	76	52.4	68	96.9	39	34.4	108

Source: Global Competitiveness Report (2019), World Economic Forum, Schwab (2019)

Hossain and Hossain [18] urged that Bangladesh should focus on trade-related activities for its sustainable economic development rather than remittance earnings. All kinds of connectivity play a significant role in establishing bilateral relations, improving trade, and creating economic opportunities. Addressing the significance of Banglabandha port, they urged these strategic ports to connect India, Nepal, and Bhutan in a very short distance. Since the emergence of the port in 2014, trade has increased among the countries through the Banglabandha port. All neighboring countries can gain from the development of the intra-network by using the port, and it will contribute to the improvement of the living standard for all. Bangladesh can benefit from transit facilities in this port and increased business scope.

Karim and Islam [19] accentuate extending the BCIM connectivity as they urge that all countries of the BCIM specialize in different sectors that have the potential to increase intra-country economic development. They went on to explain that Myanmar has positioned itself to be a major exporter of primary goods and offers an abundance of cheap labor. India is one of the top exporting nations of services in Asia while China has the competitive advantage of being the largest manufacturing exporter in the world. Bangladesh is engaged in both service exports and low-end manufacturing goods. Given this fact, BCIM connectivity can extend new areas of opportunities for trade and investment in these regional peers.

### 3. METHODS OF THE STUDY

To get the perspectives of relevant stakeholders about the potential benefits to Bangladesh from

the connectivity, a small perception survey with stakeholders was conducted. In this research, a sensitivity analysis was also used to determine how different values of an independent variable affect the dependent variable under a given set of assumptions. It also analyzed the effect of connectivity fees on trade diversion, cost of physical infrastructure, discounted percentage rates and fees, changes in the net present value or benefits, and return from connectivity.

The predominant objective of this study is to assess the gains or losses of bilateral connectivity between Bangladesh and India. Hence, the study keenly focused on estimating the net present value (NPV) and other statistics like internal rate of return (IRR) and benefit-cost ratio (BCR). After collecting data on costs and benefits, the Net Present Value (NPV) was calculated using the standard discount rate (r). The standard formula of NPV is:

$$NPV = \sum \frac{B_n}{(1+r)^n} - \sum \frac{C_n}{(1+r)^n}$$

Where,  $B_n$  stands for the benefits in year n,  $C_n$  for the costs in year n, and r for the discount rate. The maximum charges were set based on the estimation of the CCT and the maximum potential transshipment volume was set from the study of Yunus [4]. Other indirect benefits like employment and secondary business opportunities can have some contributions to the total benefits. The cost of infrastructure development has some distinct features in Bangladesh. The pattern of development expenditures in Bangladesh shows that at an early stage, a small fraction of the total development budget is spent but the rate of spending increases as the project approaches

the end. Another important feature of development expenditure is that costs usually escalate due to the increase in project length and high material cost.

The benefit-cost ratio (BCR) is an important estimate of understanding the return of a project and hence theoretically, the BCR is defined as follows:

$$BCR = \frac{\sum \frac{B_n}{(1+r)^n}}{\sum \frac{C_n}{(1+r)^n}}$$

Therefore, BCR is the ratio of discounted total benefits and total cost. Alternatively, based on the net benefit concept, BCR is defined as the sum of discounted net benefits. Under a homogenous scale of measurements, the BCR will show the amount of returns per unit of cost. Conceptually, the BCR value over 1 will suggest the acceptance of the project, and any value below 1 will, therefore, imply a non-beneficial project. The Internal Rate of Return (IRR) is another important indicator of understanding the level of returns from a development project.

Since the sources of benefits and costs are expected to change over time due to various reasons, and the calibrated parameters in our given framework, the base scenarios of NPV and BCR are tended to change due to a change in the calibrated parameters. Hence, the sensitivity analysis will also be performed by changing the rate of estimated benefits or parameters of the study to assess how the NPV is sensitive to the changes in the parameters. The parameters used in this analysis are: (a) Transshipment charges, (b) Benefits of connectivity, (c) Building physical capacities, maintenance, and associated costs, (d) Trade potential and potential diversion, (e) Cross-cutting issues like berthing, congestion costs, (f) Freight of Vehicle in Three Connectivity Routes, and (g) Trade Comparison in BBIN and BCIM or the Silk-route Area for Trade Diversion

## 4. RESULTS

### 4.1 Benefits-Costs Analysis

Bangladesh would lose around US\$80 million per year if the connectivity facility is given to India against the current level of charges. However, a neutral (no loss, no gain) situation would emerge, if fees are determined at BDT 435 per ton. If the

fees are increased further to BDT 800 per ton, the NPV value would be US\$108 million. It is to be noted that the core committee proposed connectivity fees of BDT 1,058 per ton to compensate for infrastructure costs for developing roads and railways and improving administrative capacity and human resources, but the government agreed upon a much lower charge- only BDT 192 per ton. Thus, it implies a myopic vision of policymakers to gauge investments required to develop necessary infrastructures. The core committee proposed road usage charges of bdt318.3 for every 100 km for heavy trucks and BDT 215.9 for buses but Bangladesh finally set only BDT 52 for the use of its roads [20]. As a result, estimated NPV, BCR, IRR, and NBCR based on these rates suggested by the CCT, the project can generate a stream of benefits if connectivity fees are imposed at BDT 800 per ton. Similarly, it is to be noted that the assumed charges of BDT 800 per ton and BDT 435 per ton are very close to the estimate done by Yunus [6].

Conventionally, an NPV value is sensitive to a discount rate. Although a discount rate is a stable indicator for economic analysis, it might change due to changes in the economy. The NPV (Net Present Value) is relatively steep and the NPV shows sensitivity due to changes in discount rates. If the discount rate is as low as 5% the NPV or benefit would be nearly US\$800 million which implies that the connectivity would be beneficial. However, if the discount rate is shifted from 5% to 10%, the resulting NPV value would swiftly move down to US\$ 278 million. Further increment of the discount rate would aggravate the scenario. For example, for a 15% discount rate, the NPV would stand at nearly US\$100 million. Therefore, due to the 10% differential of the discount rate, the NPV value would jump from US\$800 million to only US\$100 million. Beyond the 10% differential, the NPV curve would flatten and become parallel to the horizontal axis implying lower sensitivity to higher discount rates. The NPV curve would cross the horizontal axis at around 26%, which shows the IRR rate of current connectivity facilities. Since the IRR follows an orthodox pattern, a higher IRR value compared to the calibrated discount rate, the undertaken project is supposed to yield stable gains compared to its costs, and hence, it can be said that the connectivity at certain conditions would be beneficial for the country.



**Table 3. Benefits of Bangladesh from connectivity/transshipment facilities to India**

Measurements	Current connectivity fees (192 BDT/ton)	Charges over 435 (BDT/ton) charges	At 800 (BDT/ton) charge	Expected Benefits (Optimum fees)	Overall remarks
Net present value (Million US\$)	-80	>0	108	278.64	The obtained value of NPV, BCR, and NBCR suggest that the project can generate a stream of benefits and the discounted total benefits will exceed the discounted total associative costs
Benefit-cost ratio (BCR)	For the current rate, Bangladesh would lose an equivalent of around US\$80 million per year. However, the neutral (no loss, no gain) situation would hold if the fees were determined at 435 BDT/ton and if fees would be further increased to 800 BDT/ton yield NPV value would be US\$108 million.			2.27	
Net BCR				1.27	
IRR				26%	

Source: authors' calculation

The transshipment charges are the direct benefits of the implementation of the connectivity. As discussed in the methodology, the NPV value is linearly associated with transshipment charges. If other things remain stable, an increase in the transshipment charges would increase the NPV value. The converse is also true if transshipment charges are fixed at 10% as suggested by the CCT, the NPV value would be a negative one (US\$104 million). Therefore, at low charges, the project would fail to generate a positive gain, which necessitates alternative investments rather than the connectivity project. The result shows that if the transshipment fees implement 60% of the proposed rate, the NPV value would be around US\$108 million.

The volume of transshipments is one of the key variables in determining the benefits of the project. The NPV value is also proportional to the potential volume of transshipment, implying larger the volume of transshipment, the larger is the volume of NPV. The information on the maximum potential volume of transshipment between India and Bangladesh is retrieved from the study of Yunus [6]. At a low level of transshipment volume, The NPV value becomes negative, if the volume of transshipment becomes lower than 35% of the maximum potential volume of transshipment. The result

shows that if 50% of the target is achieved, the project would yield a positive NPV value equivalent to US\$65 million. If the full target is achieved, the NPV value would reach around US\$278 million. If the volume of transshipment increases due to multilateral connectivity, the NPV will also continue to increase. The future size of NPV depends on the optimal volume of transshipments.

According to CCT, the total cost of building physical infrastructures would be BDT 48 thousand cores. This cost would partially be involved in expanding existing road networks of 1,771 KM designed for the Asian Highway. The World Bank estimated that to build 4-lane highways, the estimated cost would be BDT17 crore, and the upgrade would require BDT 11 crore. The World Bank's estimation for upgrading the existing 1,771 km of roads to 4 lanes for the Asian Highway would be US\$2.43 billion. However, the government estimation would double to US\$4.8 billion. If connectivity facilities like transshipment load and unload and port facilities are integrated with the cost of the Asian Highway, the resultant cost would be much higher. According to Yunus [6], the total implementation cost of the corridor would be US\$1.8 billion. The added costs would be US\$5.87 billion if costs for other facilities as mentioned by the CCT were included. Therefore,

the cost would be divided into the cost of road networks and infrastructures for connectivity and transshipment. However, they are absent in the analyses of Yunus [4] and CPD [21]. He mentioned that the total benefits for Bangladesh in the first year would be nearly US\$98 million, US\$2 billion after two years, and US\$5.9 billion after 11 years but incurring a huge amount with higher interest tide loan from India for a Middle-Income country like Bangladesh would be profitable. For dredging and maintaining inland waterways, the cost would be US\$250 million (The CCT Report) and for the Chittagong Port, the development cost would be US\$350 million. However, returns from these investments would be at best US\$400 million after ten years<sup>5</sup>. Thus, the government needs to consider the implementation of the project as the return would be much lower. Here the graph shows that increasing the cost of developing physical infrastructure reduces the NPV value when other things remain stable. The volume of gain largely depends on the volume of infrastructure development costs. Under given charges and benefits, the aggregate gain would decline, as the cost of developing infrastructure is very high. Thus, the project would not be a favorable one.

The incremental movements under the connectivity and exports of Bangladesh to the NER would provide an extra-economic advantage to Bangladesh. Here in this connectivity treaty trade diversion for Bangladesh would be in favor of India. Given this fact, BCIM is more efficient in creating trade diversion in this region than BBIN, and regions like the Silk Road have a unique geographical location in the BCIM region with maritime communication networks. Thus, if 60% of the CCT proposed rate is implemented at the maximum level in the given lower trade diversion, a charge would not do any favor to Bangladesh. Only trade diversion through transshipment could increase vehicle freights from mainland India to the NER, which can make Bangladesh beneficial. However, there is a concern that Bangladeshi export or trade possibility with the NER is not very high. Similarly, if trade diversion increases by 50% and implementation of the CCT rate remains at 30%-60%, then the NPV value would not reflect any favorable benefits to Bangladesh. It might be ambitious if we assume that trade diversion would increase from the current level to 50%-

<sup>5</sup>As it assumed that the time of project implementation from the proposal on 2011 July and now it is 2017(Study Date). Therefore, to implement this project, minimum 2021 year would be must for government along with inflated rate.

135% and implementation of the CCT rate is at 60%. If it is possible, then the possibility of becoming a beneficiary is logically expected and Bangladesh would benefit from the connectivity agreement with India. If trade diversion increases from 50% and beyond, what Yunus [4] predicted that the possibility of earning US\$5 billion annually after five years is possible but it is over-expected.

Table 4 shows that if charges proposed by the CCT can be implemented at the highest level, trade diversion would remain limited from 10% to 55%, and no possible benefit can be earned. If there is no sensitive list of the exportable goods from Bangladeshi to the NER in the connectivity agreement, the possibility of higher trade diversion would be lower. If there is no multilateral connectivity with the transnational route, the possibility of vehicle connectivity through Bangladesh would be lower. In short, if the trade diversion increases along with the incremental of the CCT proposed rate, the situation would go in favor of Bangladesh. This indicates that Bangladesh might benefit if it is connected with the proposed Silk Route<sup>6</sup>. As the Silk Route Fund is being channeled to specific projects at a faster pace, Hongshen [22] claimed that more benefits would be in the areas of infrastructure connectivity, economy and trade, industrial investment, financial services, environmental protection, and people-to-people and cultural exchanges. Therefore, the Silk Route would build ties and bring multilateral connectivity and transshipment facilities with Eurasia and its other corridors including South Asian routes linked to Central Asia, as well as connectivity to India, China, Thailand, and Cambodia.

## 4.2 Stakeholders' Opinion

Since the debate among the experts and stakeholders regarding the optimum economic gain for Bangladesh from the proposed fees for transshipment facilities is going on, a stakeholders' survey was carried out to receive a concrete perception of the present and future connectivity. Considering the contribution to research as well as engagements in international trade and commerce, fifty respondents including

<sup>6</sup> Chinese Assistant Foreign Minister, Hongshen, Q. (2015), urged that more than 70 countries and international organizations seeking to participate and more than 30 countries had reached agreements with China, along with the Asian Infrastructure Investment Bank (AIIB) Beijing launched in January this year.

experts from Bangladesh and India were surveyed in February 2017. A semi-structured questionnaire was used to collect their opinions. Among the respondents, 38 were relevant academicians/researchers, 10 were entrepreneurs and traders, and two were customs officials. Among the respondents, eighteen had Ph.D. degrees, twenty-nine respondents completed university/master's degrees in the field of economics, finance, and commerce and only three had education at the high school level or below.

This survey tried to gather respondents' opinions about the usefulness of the process of determining fees. About 98% of respondents strongly recommended that the government should consult with all stakeholders adequately to determine the connectivity/transshipment fees. Among the respondents, 64% opined that the determined transshipment fee of BDT 192 per ton of goods is not justifiable; however, only 20% thought that the existing rate is justifiable and another 16% were not sure whether the rate is justifiable or not. Even at the current condition of port and road capacity, if comprehensive

recommendations of the CCT-2011 were taken into consideration, about 27% more revenue would be earned (through the addition of congestion and water pollution charges) compared to what had been realized. And if an inflation adjustment was made, this would result in a doubling of the current revenue earnings.

Moreover, 62% of respondents opined to carry out an independent review by renowned global experts to get in-depth insights and an overview of the cost-benefits from the connectivity facilities.

Building the new Silk Road trade routes as masterminded by Chinese President Xi Jinping appears a game-changer in South Asia. China as one of the most influential global powers with its economic model with the inclusion-led 'One Belt, One Road' project has taken on a new significance for a country like Bangladesh. With existing bilateral transshipment facilities between India and Bangladesh, this survey tried to identify which connectivity facilities would be the best possible option for Bangladesh to gain optimum economic and trading benefits. Sixty-eight

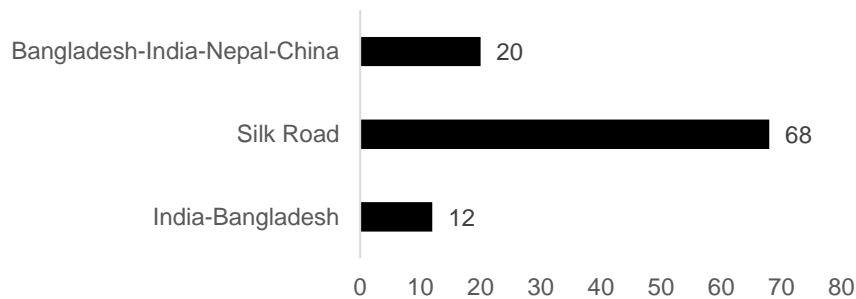
**Table 4. Trade diversion and connectivity fees**

		Negotiable fees rate, the percent of fees proposed by the CCT									
		30%	34%	38%	42%	46%	50%	54%	56%	58%	60%
Percentage of trade diversion	10%	-135	-133	-131	-129	-128	-126	-124	-123	-123	-122
	15%	-128	-126	-123	-121	-118	-115	-113	-112	-110	-109
	20%	-122	-118	-115	-112	-108	-105	-101	-100	-98	-96
	25%	-115	-111	-107	-103	-98	-94	-90	-88	-86	-83
	30%	-109	-104	-99	-94	-89	-83	-78	-76	-73	-71
	35%	-103	-97	-91	-85	-79	-73	-67	-64	-61	-58
	40%	-96	-89	-83	-76	-69	-62	-55	-52	-49	-45
	45%	-90	-82	-75	-67	-59	-52	-44	-40	-36	-32
	50%	-83	-75	-66	-58	-49	-41	-32	-28	-24	-20
	55%	-77	-68	-58	-49	-40	-30	-21	-16	-11	-7
	60%	-71	-60	-50	-40	-30	-20	-9	-4	1	6
	65%	-64	-53	-42	-31	-20	-9	2	8	13	19
	70%	-58	-46	-34	-22	-10	2	14	20	26	32
	75%	-52	-39	-26	-13	0	12	25	32	38	44
	80%	-45	-31	-18	-4	9	23	37	43	50	57
	85%	-39	-24	-10	5	19	34	48	55	63	70
	90%	-32	-17	-2	14	29	44	60	67	75	83
	95%	-26	-10	6	23	39	55	71	79	87	95
100%	-20	-3	15	32	49	66	83	91	100	108	
105%	-13	5	23	41	58	76	94	103	112	121	
110%	-7	12	31	49	68	87	106	115	124	134	
115%	0	19	39	58	78	98	117	127	137	147	
120%	6	26	47	67	88	108	129	139	149	159	
125%	12	34	55	76	98	119	140	151	161	172	
130%	19	41	63	85	107	130	152	163	174	185	
135%	25	48	71	94	117	140	163	175	186	198	

Source: Authors

**Table 5. Qualitative responses of the experts (% of the respondents)**

Question	Yes	No	Not sure
Earlier the Bangladesh Tariff Commission proposed Tk 1,058 per ton as a transshipment fee, but the government finally agreed upon only Tk 192 per ton. Do you think that is justifiable?	20	16	64
Do you think that an independent review by renowned global experts of the cost-benefit of connectivity facilities is required?	62	38	-



**Fig. 2. To your understanding/experiences, which type of connectivity facilities would be more beneficial to the economy of Bangladesh? (% of the respondents)**

Source: Perception Survey (2017)

percent of respondents claimed that the proposed Silk Route (China-Myanmar-Bangladesh-India-Europe) would be more beneficial to the economy of Bangladesh rather than the existing India-Bangladesh or Bangladesh-India-Nepal-China route. Interestingly, only 12% of academicians/researchers have found India-Bangladesh bilateral connectivity is beneficial to the economy of Bangladesh.

## 5. DISCUSSION

The CCT report mentioned that the proposed connectivity facility may reduce Indian transport travel from 1650 km to 350 km. This facility would harm exports of Bangladeshi goods to India's Northeastern states as Bangladesh imposed a tariff fee of BDT192 instead of BDT1058 per ton. Although Bangladesh was given duty-free access for almost all products, expected benefits would not be attained due to various kinds of non-tariff measures in India. Therefore, the export of cement, plastic products, iron sheets, mild steel, rods, stonefish, etc. from Bangladesh might come down. Bhuyah [3] informed that goods transported to Eastern and NE India to other parts are essential goods, for example, rice, diesel engines, etc. The total flow of goods from the western part of India to Eastern and NE states accounts for 60%. Similarly, from Eastern and NE states mainly

coal and coke, vinegar, plywood, LPG, bamboo, and papers are traded. These goods can constitute the most exportable goods from Bangladesh to seven sister states of India.

The Core Committee proposed BDT1,058 per ton as a connectivity fee but the government decided to set a much lower tariff - only BDT 192 per ton, of which the customs department will get BDT 130, roads and highways BDT 52 and inland water transport authority BDT 10. These fees lacked adequate foresight and ignored required investments to develop necessary infrastructures. Eventually, Bangladesh failed to build a shed or install a scanner at Ashuganj Port. The customs fee was fixed based on the rule of thumb. It was not done by thorough analysis and measurement while the CCT report urged that the country will have to improve services, administration, human resources, customs, infrastructure, ports, railways, waterways, and roads to provide services to India. The Core Committee proposed a road usage charge of BDT 318.3 for every 100km for heavy trucks and BDT 215.9 for buses but Bangladesh decided to charge only BDT 52 for the use of its roads [7].

Rahman said that the existing infrastructures on inland water connectivity through Ashuganj are not capable of sustaining the heavy load of cargo wagons. Similarly, to provide river connectivity,

Bangladesh has to develop 58 kilometers of roads costing BDT 790 million. On the other hand, the 18-meter width of the Ashuganj-Akhaura road is not suitable for handling Indian cargo. Thus, long-term connectivity through this road is a matter of concern, if its width would not be widened further 12 feet. Similarly, if 100-200 cargo ply on connectivity roads every day, the communication system of Bangladesh would be congested by traffic jams. Moreover, stakeholders urged unless extensive dredging in rivers in Vairab and Ashuganj is undertaken, the connectivity facilities would hamper the transport and communication system of Bangladesh.

Bhuyah [3] mentioned that India now spends about Rs 100 billion every year in c/w transportation across Shiliguri. If India contributes half of this amount, both countries will benefit and Bangladesh would earn Rs. 50 billion, or BDT 60 billion every year. In the 2015-2016 fiscal year, Bangladesh imported goods equivalent to US\$6.5 billion from India, at the same time Bangladesh exported goods amounting to only US\$527 million. According to the Bangladesh Bank and Export Promotion Bureau report, the trade gap between Bangladesh and India increased by 33.76% in the last year. According to the CCT report, if the corridor is given to India, she would save US\$210 per truck because of the reduction of distance by 600 km. Eventually, Bangladesh might lose exports amounting to around US\$200 million to India's seven sister states. Majumder [23] claimed that after giving connectivity fees, bridge tolls, and other charges, the potential gain for India would be at least US\$100, equivalent to nearly BDT 8,000 per ton. As a result, India will be able to save time and BDT10 per ton for fuel and transportation costs to ferry goods from mainland India to its northeastern parts through the Bangladesh Inland Water Transport Agreement (BIWTA) sounds very cheap. If India's one-third of the goods can be sent through the chicken neck, Bangladesh would be able to earn around BDT 900 crore per year but it solely depends on judiciously charging of fees. Economist and former Caretaker Government Adviser Islam [24] said that "Bangladesh government astonished the nation by allowing two shipping secretaries to fix low connectivity fee at their Delhi meeting".

Similarly, Bhattacharya [25] said there was no scope to settle connectivity fees in the peculiar circumstances, that Bangladesh and India are facing under the WTO rules. He further added

that the circumstances in Europe and Africa were very different while in Europe and Africa, only landlocked countries are given connectivity against payment of much higher connectivity fees. Similarly, in South Asia, neither Nepal nor Bhutan, got the connectivity as deserved for being landlocked countries. Bhattacharya further expressed doubts that the interests of Bangladesh were protected by fixing the connectivity fee at BDT 192 per ton for transporting Indian cargo through Bangladesh. He stressed that the rate was much lower than charging BDT 1,058 per ton recommended by the Bangladesh Tariff Commission. The Core Committee report expressed that Investment worth above US\$7.0 billion, will be required to upgrade existing infrastructures in Bangladesh to operationalize the proposed connectivity agreement.

Rahmatullah [1] claimed that with the connectivity, India would open up its seven sisters to its neighboring countries for building greater political harmony in South Asia. Such integration is especially crucial to North East India, as this connectivity would end their landlocked or semi-isolated status and provide access to seaports through shorter transport routes. For Indian policymakers, the most potential lanes for connectivity are Benapole to Tamabil and Benapole to Akhaura. According to Ahmed [26], Bangladesh has to invest more than US\$1.5 billion to make additional infrastructure for which India had given a tide loan of US\$1 billion. This loan must be repaid with a 1.75% interest rate within 20 years and with 5% extra commitment fees. Ultimately, this interest rate stands at 6.75%. Under this tight loan, the investor country would like to invest the loan in some prioritized projects with lower interest but the situation is different considering the connectivity to India. In this regard, there is no specific modality for the utilization of the loan. Given the concern, no country would like to take this tide loan with a higher interest rate as it is against the interest of a country. On the other hand, connectivity could be used as a tool to resolve other long-standing bilateral issues between Bangladesh and India like the Teesta water treaty, the determination of the geological border, the implementation of connectivity treaty with Bhutan and Nepal, fencing in border areas and other political and economic issues. However, if India transports military weapons, it would engender attacks from militant groups and other artilleries as the connectivity does not include any sensitive list or restricted product list.

De and Khan [4] demanded that the glut of connectivity and WTO sections V, VIII, and X and development processes need to be reviewed. The Barcelona Connectivity Convention 1921 and New York Connectivity Convention 1965 do not allow toll and tariff-free connectivity for a country that is not landlocked. It implies the non-imposition of connectivity fees or lower fees for the sake of international connectivity law is a vacuous argument as we cannot prove India is a landlocked country.

The Silk Road Economic Belt focuses on bringing together China, Central Asia, Russia, and Europe (the Baltic) to opportune trade and investment in these areas. The Silk Road would connect China with the Persian Gulf and the Mediterranean Sea through Central Asia, West Asia and Southeast Asia, South Asia, and the Indian Ocean. The 21st Century Maritime Silk Road is designed to connect China with Europe through the South China Sea and the Indian Ocean in one strand, and the South Pacific in the other strand. Zhu [27] mentioned the Silk Route initiative ensures win-win cooperation and reciprocal benefits among the participating countries. The “Belt and Road” initiative is an open platform that covers Asia, Africa, Europe, and the Indian Ocean Region. The “Belt and Road” would revive traditional geo-economic cooperation where economic cooperation would be the main thrust. Both the Silk Road Economic Belt and 21st Century Maritime Silk Road are geo-economic connections in Asia and Europe and the Indian Ocean Region. One Belt One Route (OBOR) has existed since the ancient period, facilitating mutual benefit and prosperity through establishing a network to facilitate transportation, trade, and exchange of capital and people. India has also shown its interest in this initiative, but it has some strong reservations. To counter China’s Silk Road Economic Belt and 21st Century Maritime Silk Road initiative, India recently proposed the “Cotton Route”, to strengthen its diplomatic and economic relations with countries in the Indian Ocean to reduce China’s increasing influence.

The Chinese government has decided to establish a “Silk Road Fund” with a capital of US\$40 billion to show its capital strength. However, Indian policymakers are hesitant to join this initiative with apprehension about China’s growing influence in the region. During President Xi Jinping’s visit, Dhaka agreed to give full support to China’s initiative and both countries termed their relationship as a strategic

partnership and signed government-to-government deals worth US\$24.45 billion. Besides, private Chinese companies pledged US\$13.6 billion in investment in Bangladesh. Earlier, Pakistan, Sri Lanka, and the Maldives, three SAARC members, agreed to the plan of OBOR. China, the world’s largest exporter of goods since 2009, needs such a network to maintain its double-digit growth by opening new markets for its consumer goods and increasing its dominance over the region. For this reason, as a communication hub in the subcontinent, Bangladesh can extract a major proportion of investment from the Silk Route infrastructure investment. Russia’s formation as an independent center of the world’s politics depends a lot on the successful implementation of EEU and ‘One Belt, One Road’ initiatives. He also underscored that China’s One Belt, One Road project has also got a geopolitical dimension, and, therefore, the USA and its allies increasingly perceive China as a serious challenge. The economies of China, the USA, and the EU have become so interdependent that in the event of political friction between Beijing and the West, it will be extremely difficult for the latter to take measures against China, similar to those they adopted against Russia. Therefore, Korneev stated that this cold diplomatic relationship has forced China’s President Xi Jinping to shift the focus of its foreign policy from “defense” to diplomatic “offense”. Maritime Silk Route, focusing on economic cooperation can act as a “buffer zone” between the political and the economic, political, and security cooperation to avoid a direct impact on each other.

## 6. CONCLUSION

The potential gain from the connectivity depends on the volume of goods transported through the bilateral connectivity. The employment opportunity would benefit the country but the level of impact on total labor demand is obscure on the one hand. On the other, the size of the benefits essentially depends on the quality of transshipment facilities along with rationally fixed charges. Given this context, better physical infrastructure is required to ensure smoother routes of connectivity, incurring the increased public expenditure. The assurance of all types of facilities for effective connectivity will eventually escalate the costs but the volume of benefit mostly depends on the demand for using those facilities and trade creation. In that case, the multilateral connectivity choice can be preferred to the bilateral one under the presumption of the

high volume of goods shipment due to multilateral connectivity. Having the huge amount of trade gap between India and Bangladesh which amounts to US\$11.70 billion in a year due to some trade and non-trade barriers on exportable products, Bangladesh may think further about increasing charges fees and inclusion of Bangladeshi exportable products in the sensitive list for transit & transshipment, charges for using inland waterways and roads, ports connectivity facilitation charges, toll charges for usage of major bridges, infrastructure damage cost, congestion fees, accident externalities, and environmental pollution. Especially, the land demurrage fees should be considered as such infrastructure costs our limited agricultural farming field. Bangladesh could take some pragmatic measures as regard to ensure domestic interest, cited in the following:

1. The rates of transshipment charges or fees should be revisited between Bangladesh and India. According to the cost-benefit analysis, any value less than BDT 435 is not economically beneficial.
2. The revival of the BCIM corridor and Silk Road along with connectivity through the Asian Highway is the efficient option in terms of economic gain.
3. With the development of the Asian Highway, Bangladesh should further look into the matter of silk-route connectivity including maritime silk-route.
4. Since India is keen to get access to the *Mongla* and *Chittagong* ports, the charges related to congestion (at the port and on roadways) and water pollution should be considered critically to control the potential traffic of cargo.
5. The existing trade agreement between India and Bangladesh is reciprocal. Bangladesh should reap the benefits of transporting goods to Nepal and Bhutan by using the territory of India.
6. Connectivity should not be seen only as a vehicle for revenue generation but should be treated as a means of developing the option of regional connectivity and political interest.
7. Infrastructure development should not be delayed since further delay would not only escalate cost and time but also offset the possible spillover benefits that the country has.
8. The imposition of a sensitive list of products on a transshipped product by India is required to survive the Bangladeshi domestic exportable product market in the NER and to

restrict transfer artillery from mainland India to the NER.

9. Domestic vehicles and ships should be the preference while transshipment of foreign goods.
10. Before allowing the use of the Chittagong and *Mongla* Ports, the deep seaport of *Shonadia*, *Payra*, and *Matarbari* are required to be constructed, as a deep seaport can earn a minimum of 1 billion dollars per year, reducing the pressure on India. Given the above facts, Bangladesh should focus on multi-country connectivity facilities rather than bilateral connectivity. Policymakers should focus more on economic benefits rather than tiny revenue earnings from the fees. Moreover, the government should carry out a comprehensive study to determine the optimum connectivity fees, considering all of the components of the costs and benefits.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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