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Social impact assessment approach of a proposed bridge project A case study of a bridge over a branch of Meghna river in Bangladesh

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Abstract:

The river network of Bangladesh is the most important transport artery in the country's communication sector plays a vital role in national life. Almost all big cities, towns and commercial centres of the country grew up on the banks of its rivers. To achieve the targets of Vision 2041, the improvement of the transport networks must be a priority to overcome the existing river barriers and effectively connect the various regions of the country. The construction of bridges plays a key role in the transport policy and therefore, in the development of the country. Different roads in different regions of the country and bridges of different lengths on different rivers specially on Meghna has been proposed. Different literature study has established the fact that construction of the new bridges have negative as well as positive social impacts. In this paper efforts has been made to analyse the negative and positive social impacts of a bridge over braanch of Meghna river connecting the two upazilas where is only mode of transportation is by means of mechanised boat . Paper discusses the fact that there are some negative impacts for short period but in long run it will have high positive impacts to achieve the Sustainable Dvelopment Goals (SDGs) and Delta Development plans of Government of Bangladesh and it will enhance the quality of life of the people in the region.

Keywords: Vision 2041, Social Impact, Bridge , Sustainable

Introduction: With a population of approximately 166 million people and a land mass of only 148,000 sqkm, Bangladesh is the most densely populated country in the world. Bangladesh is a riverine country trisected by three major rivers: the Padma (Ganges) River, the Jamuna (Brahmaputra) River, and the Meghna River. About 700 rivers with numerous tributaries and distributaries of these rivers constitute 24,140 km of river network carve the country into a number of islands and peninsulas, particularly in the south, in the vicinity of the Meghna River delta, the largest river delta in the world (Abdul Wazed 1991).

The river network of Bangladesh as the most important transport artery in the country's communication sector plays a vital role in national life. Almost all big cities, towns and

commercial centres of the country grew up on the banks of its rivers. It is widely accepted that the provision of transport infrastructure drives the development progress of a country, and in the case of Bangladesh, supported by the ambitious policies of Vision 2041, the improvement of the transport networks must be a priority to overcome the existing barriers and effectively connect the various regions of the country. The partitioning generated by the rivers in the territory causes great sociocultural differences among the population and uneven economic growth between them. (Hugh Brammer 1996)

The construction of bridges plays a key role in the transport policy and, therefore, in the development of the country. The government of Bangladesh has fostered the preparation of a bridge master plan to lay the foundations for the development of the country's transport network.

The Government of Bangladesh has made significant efforts in order to place the country among the most developed nations in the globe and supported by a vibrant private sector. In this regard, a series of strategic plans have led the investment in crucial sectors and projects according to the Government's visions 2021 & 2041. Among the measures to reach the main objective in 2021, "Infrastructure development" was identified to play a crucial role within the "Economic development" vision for the country. Government Vision 2041 target is a long-term perspective plan to make Bangladesh a peaceful, prosperous, happy and developed nation comparable with the developed world. Objectives and policies are closely inspired by the Sustainable Development Goals (SDGs) to face the expected pace of transformational change for Bangladesh regarding agriculture, trade and industry, education and healthcare, transportation and communication. The Vision 2041 is not only focused on reaching certain targets, but it also seeks sustainability of development. (bba.gov.bd)

In order to deal with the situation described above and to meet the Sustainable Development Goals (SDGs), the Government of through different departments is developing different transport sector Master Plan Study for the years 2020-2050. Considering the existing problems of the transport sector in the country, the Master Plan is aimed at providing an efficient tool to prioritize the most feasible projects to be undertaken in the following years. Therefore, under these project master plan different roads in different regions of the country and bridges of different lengths on different rivers specially on Meghna has been proposed. Out of which a Bridge over branch of River Meghna connecting two upazilas (North side Gazaria and South side Matlab Uttar) has been considered for the Social Impact Assessment (SIA) study. (bba.gov.bd)

Different literature study has established the fact that through the construction of the new bridges have negative social impacts (Dutta 2014) which may be summerised as follows -

1. Acquisition of lands
2. Displacement of people
3. Unemployment and loss of property
4. Reduced income from agriculture and poultry

5. Economic loss for the tenants, farmers and sharecroppers as they were not considered for compensation
6. Deforestation
7. Adverse impacts on terrestrial flora and fauna
8. Adverse impacts on aquatic flora and fauna
9. Land use changes
10. Promote erosion of the river bank
11. Potential risk on human health and the spread of diseases like HIV/AIDs
12. Increase in Carbon footprint of the region
13. Increase in Ecological footprint of the region
14. Rehabilitation and Resettlement of the affected people

Thus the positive social impact of construction of bridge project are -

1. it will improve the regional connectivity and economy as well as quality of life of the people in the region
2. Will reduce and will elimiate river launch and boat accidents
3. Reduce travll time to health care facilities and Educational institutes
4. Reduce travel time for transportation of Agricculture products and raw matrial for industries
5. Promote industrial growth in the reason
6. Promote tourism in the region

Positive Social Impacts can be felt in long run but negative social impacts of the bridge starts form the constrution stage of the bridge .To minimise the negative social impacts Social Impact Assessment (SIA) study need to be conducted and Social Impact Mamanagement Action Plan (SIAMP) need to be prepared . (Siddique 2013)

In this paper an effort has been made by the author to describe the social Impact Assessment (SIA) of the bridge project considered for study and to find out the negative as well as positive social impact on the project area and to suggest the Social Impact Management plan to minimise the impacts.

Materials & Methods:

Project considered for study: The proposed Cable stayed bridge of 1.9 km and approach road of 5.24 km - is a bridge project over the river which is a branch of Meghna and an approach road connecting N1 highway at Bhaberchar at north side and Meghna – Dhonagoda irrigation project embankment road which is claasified also as District road (Zila road) Z1069 near Kalipura bazar at south side (Figure -1). Some important settlements on the northern side of the proposed bridge are – Shonali Saikat,Sholani,Charkalikapur,Mollakandi,Adharmanik,Baghaikandi, Jastitola, Barokalipura, Kalipura and Chandakahania and on the southern side of the proposed bridge are – Chotokinar chok, Borokinar Chok, Beltoli bajar, Kalipur, Kalipurbajar and Mustafapur.The current connection between Northern side (Gazaria) and Southern side (Matlab Uttar) is established through Ferry crossings for goods vehicle at one location and several formal and

informal boat crossings at several locations. This adversely affects the trade, economic as well as social life in the area. The project is to develop direct road connectivity between Gazaria and Uttar Matlab by way of building a long bridge across the braided channels of Meghna branch (Dhonogoda) river.For this study, the bridge has been considered not only as a local connection, but also as part of a bigger plan: a North-South corridor near the Meghna River. (bba.gov.bd)

Figure 1: The proposed bridge location

The study area for Social Impact Assessment (SIA): The study area considered for the SIA is the Unions which area directly affected . The Unions ara Imampur of Gazaria Upazila , Munshiganj district and Shatnol and Sadillapur of Matlab Uttar Upazila of Chandpur district .

Social Impact Assessment (SIA) Methodology: The origins of SIA largely derive from the environmental impact assessment (EIA) model, which first emerged in the 1970s in the U.S. In the United States under the National Environmental Policy Act. Social impact assessments are federally mandated and performed in conjunction with environmental impact assessments. SIA has been incorporated into the formal planning and approval processes in several countries, in order to categorize and assess how major developments may affect populations, groups, and settlements. (IAIA 2015)

The legal basis of SIA (and thereby increasing standing and public awareness) first emerged in 1969/1970 when the US National Environment Policy Act (NEPA) introduced a requirement to ensure that major federal actions significantly affecting the quality of the human environment were incorporated into a balanced and publicly available assessment of the likely impact of such actions (Vanclay 2013).

Social Impact Assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Social impact assessment (SIA) is a process for the identification, analysis, assessment, management and monitoring of the potential social impacts of a project, both positive and negative. The social impacts of a project are the direct and indirect impacts that affect people and their communities during all stages of the project lifecycle. (IAIA 2015)

SIA is much more than the prediction step within an environmental assessment framework. Social impacts are much broader than the limited issues often considered in EIAs (such as demographic changes, job issues, financial security, and impacts on family life). Social impact assessment (SIA) is a methodology to review the social effects of infrastructure projects and other development interventions. Although SIA is usually applied to planned interventions, the same techniques can be used to evaluate the social impact of unplanned events. (Vanclay 2013).

Social Impact Assessment Variables considered for this Social impact assessment study (Department of State Development , Australia 2018) are -

1. Population Characteristics
2. Community and Institutional Structures
3. Political and Social Resources
4. Individual and Family Changes
5. Community Resources

Steps in the Social Impact Assessment Process considered for this social Impact Assessment study are-

1. Public Involvement – Development of an effective public plan to involve all Project Affected Persons (PAPs)
2. Identification of Alternatives - Describe the proposed action or policy change and reasonable alternatives
3. Baseline Conditions - Describe the relevant human environment/area of influence and baseline conditions
4. Scoping - After obtaining a technical under-standing of the proposal, identify the full range of probable social impacts that will be addressed based on discussion or interviews with numbers of all potentially affected
5. Projection of Estimated Effects - Investigate the probable impacts
6. Predicting Responses to Impacts - Determine the significance to the identified social impacts
7. Indirect and Cumulative Impacts - Estimate subsequent impacts and cumulative impacts
8. Changes in Alternatives - Recommended new or changed alternatives and estimate or project their consequences
9. Mitigation - Develop a mitigation plan

10. Monitoring – Develop a monitoring program

For this study Social Impact Assessment study was done in a simplified method (Atahar, 2013) based on the following steps -

1. Focus Group discussion with local people
2. Public Consultation Meeting (PCM)
3. Socioeconomic Survey
4. Land Survey
5. Property Valuation Survey/Market Survey
6. Census and Inventory of Losses
7. Video capturing of the alignment
8. Video filming of the affected properties
9. Public Disclosure on the SIA report
10. Preparation of Social Mitigation Action Plan

Results:

Social impacts of the project

1. It is estimated that total 180.8325 acre land will be affected during the construction of Bridge Project from 745 plot.
2. Based on the engineering design It is estimated that around 180.83 acres land will require acquisition for the project.
3. It is identified that the land acquisition will require from 745 plots of 11 administrative Mouzas.
4. According to the detailed census and Inventory of loss (IOL) survey, total 115 project affected units including 112 HHs and 3 CPRs will be affected by losing their immoveable assets.
5. Due to acquisition of land 26739 sft residential and commercial structures will need to be dismantled. Apart from the primary structures a significant quantity of secondary structures will also be affected. T
6. The assessment also identified that 17 business premises including running business will be affected by the project interventions. Table 1 below shows summary of land acquisition impacts by Interventions.

Table 1 : Summary of the Social Impact of the project

Sl. No.	Project Impacts	North side of bridge	South side of bridge	Total
01.	Amount of affected land (acre)	121.9925	58.8400	180.8325
02.	Amount of affected private land (acre)	106.1075	31.4475	137.5550
03.	Amount of affected Government land (acre)	15.8850	27.3925	43.2775
04.	Number of Mouza affected	7	4	11
05.	Number of total HHs affected by structure	32	2	34
06.	Persons loosing Only Land	59	19	78
07.	Number of CPRs affected	3	0	3

08.	Total number of Project Affected Units	94	21	115
09.	Number of business affected	16	1	17
10.	Number of Vendors affected	13	0	13
11.	Number of trees affected	625	49	674
12	Total number of persons affected	285	96	381

Source: Field survey and Land record

Table 2 : Status of Ownership of Impacted Land in Acres

Particulars	Private land	Govt. Land	Total Land within Mouza boundary	River area out of Mouza boundary	Total alignment
Total	137.5550	43.27	180.8325	17.5266	198.3591

Source: Field survey and Land record

Table 3: Impacted land by Type / Land use under different mouzas

Upazila	Mouza	Null/ Agri Land	Home stead	Vita	Ditch	River	Canal	Road	Total
North side of the bridge	564	104.91	1.01	0.19	0.97	8.24	2.54	4.14	121.99
South side of the bridge	181	31.10		8.07	16.87	1.27	0.93	0.61	58.84
Grand Total 745		136.01	1.01	8.26	17.84	9.51	3.47	4.75	180.83

Source: Field survey and Land record

Table 4: Quantities of Affected Primary Structures

SL	Structure Type by construction	Unit	North side		South side		Total	
			Number	Quantity	Number	Quantity	Number	Quantity
01.	Pucca	Sft	4	5897	0	0	4	5897
02.	Semi Pucca	Sft	2	3258	3	840	5	4098
03.	Tin Made	Sft	42	9974	1	592	43	10566

Source: Source: Field survey and Land record

Table 5 : Total Number of affected Trees

Upazila	Row Labels	Fruit bearing	Timber	Timber & fruit	Banaba	Papaya	Total
North side	Large	101	1	16	0	0	118
	Medium	103	100	19	2	7	231
	Plant	22	0	0	0	0	22
	Small	123	107	24	0	0	254
Sub total		349	208	59	2	7	625
South side	Large	0	0	16	6	0	22
	Medium	27	0	0	0	0	27
	Plant	0	0	0	0		0
	Small	0	0	0	0	0	0
Sub total		27	0	16	6	0	49
Grand Total							674

Source: Source: Field survey and Land record

Note : With more than 4 feet of girth at the chest position has been classified as big tree.
Trees having 2-4 feet girth is classified as medium.
Three having less than 2 feet girth is classified as small
Tree planted for gardening or growing up is classified as sapling

Table 6: Business information

Type of Business	North side	South side	Total
Large	0	0	0
Medium	1	0	1
Small	15	1	16
Total	16	1	17

Source: Source: Field survey and Land record

Discussion: According to the study of the SIA for this route, there are total 180.8325 acres' land needs to be acquired for construction of the selected Bridge Project. of the total land, 121.9925 acre from North side and 58.84 acre from south side.

As per the detailed IOL survey and census a total of 112 HHs and 3 CRPs will be affected. Out of the total HHs, 29 HHs will be physically displaced.

The survey and assessment quantified different losses & impacts of lands & properties and population displacements due to land acquisition for the project. The survey results, have been used to prepare the Social Impact management Plan . Survey assessments preparation has been done based on preliminary engineering design considering the The Acquisition And Requisition of Immovable Property Act, 2017 (ARIPA, 2017) Government of Bangladesh .

Ownership Status of Impacted Land: According to the survey for the project, the project has to acquire 180.8325 acre land from 11 Mouzas from two upazila. Both private (137.5550 acre) and government (43.2775 acre) land will be affected during the project intervention. Though 180.8325 acre land will be required for acquisition, there are total 198.3591 acre land inside the final design, of which 17.5266 acre are river and not included within any of the mouzas. Of the total land, 157.5821 acre will be required for Right of Way (ROW) (151.1075 acre within mouza and 6.4746 acre over the river), 11.0520 acre for construction yard (char land out of mouza boundary), and remaining 29.725 acres for other ancillary purposed like toll plaza, Control Building & Weight Station and engineer's facilities. According to the Khatians, 696 recorded land owners have been identified who are losing private lands. (Figure 2)

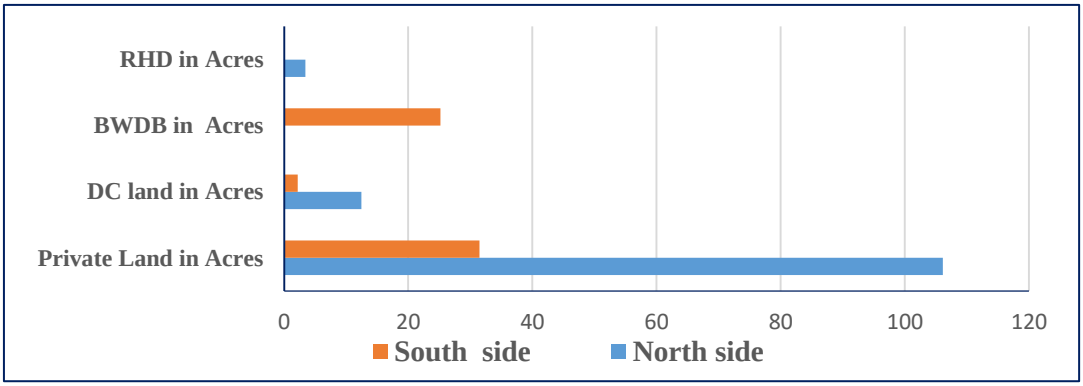
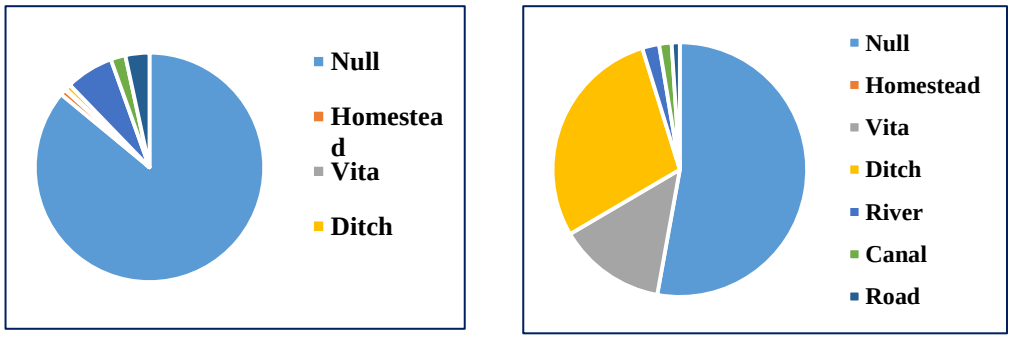


Figure 2: Ownership Status of Impacted Land

Land Impact by Use: Impacted land by type/land use (from Khatian) under different mouzas shows that the proposed acquisition of null land Agriculture land (136.01 acre) is the highest followed by other categories of land among the total land. There are also some homestead, vita, ditch and pond categories of land will be affected. Table shows detailed impacted land by Type/Land use (from Khatian) under different mouzas. (Figure 3)



North side South side

Figure 3: Land Impact by Use

Affected Primary Structure: Census and IOL survey result indicate that different types of fixed assets such as Pucca, Semi Pucca, Tin-made Katcha and Thatched structures will be affected. Total 21539 sft primary structure will be affected by the project from 56 structure, including 5897 sft pucca , 4098 sft semi-pucca, 10566 sft tin made, 908 sft Katcha and 70 sft thatched structures. Almost 50% of the affected structure is made of tin. The structures will be affected from two Upazila, namely Matlab Uttar and Gazaria). DC will pay compensation to the titled affected people following the ARIPA 2017.

Affected secondary structure: Apart from the primary structures some secondary structures will also be affected by the project such as tin made boundary wall, Hand Tube well, Katcha Toilet, Sanitary Toilet and Slab Toilet. Most of the affected secondary structure will be from Gazaria side. Table below shows impact on the secondary structures

Impact on Community Property Resources (CPRs): There are total two Jame Mosque and one government rehabilitation project will be affected during project intervention. All the CPRs are located in Gazaria side. Both of the mosques will be relocated during the project. One government housing project will be affected. Two of the house will be totally affected. There is khash land on the other side of the project

Affected primary structure (CPR): Total 5200 sft primary structure will be affected from three CPRs, of the total structure, 1760 sft semi pucca and 3440 sft tin made structure. All the affected CPRs are at Gazaria side of the river.

Impact on Affected Trees: The trees affected by the project are categorized into four different sections based on sizeand re-divided into five categories of Fruit bearing, Timber, Timber & fruit, Banaba and Papaya. Total 674 trees will be affected along affected areas by the project. Most of the affected trees (625 out of 674) are from Gazaria Upazila.

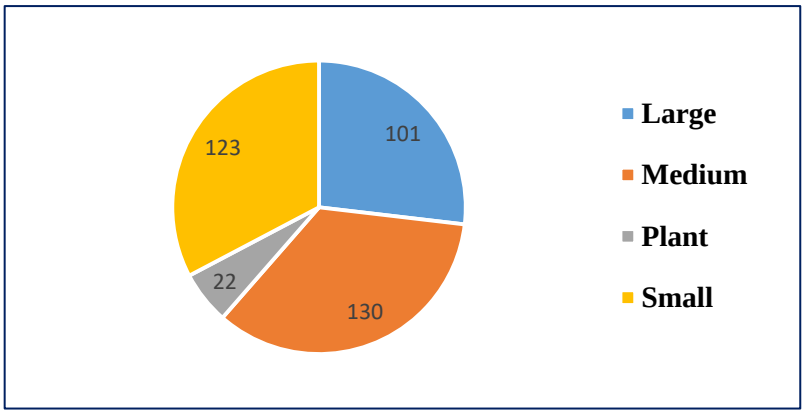


Figure 4 : Distribution of tress affected by the project

Impacted on Business: According to the IOL survey, 17 shops will be displaced permanently by the project interventions including 16 shops at north side and one shop at south. Of the total business, one Medium business and 16 are small business. Survey also revealed that there is no temporary business will be affected in the Right of Way. Table beneath shows the detailed impacts on business by type.

Impacted Employees: Though the project will affect on some business, it was found during the IoL survey that no employ will be affected by the project as all the business are small or medium.

Impact on Agriculture & Farming: According to the survey, no HHs will be affected by losing agriculture (crops) and farming. During the project implementation period, respective DC will assessment whether any affects during the project implementation period and based on the assessment, DC will pay the compensation for the standing crops and fisheries.

Positive Social Impacts:

Corridor for Economic Zones: There are plans to build two economic zones in Chandpur District (Matlab Uttar and Haimchar) and seven private economic zones in Munshiganj District at Gazaria Upazila. The proposed bridge together with an access road that is connected to major trunk road such as National Highway (NH1) will attract companies to the planned EZs and boost the economic development in the region. It is expected that the construction of the bridge will have an impact on the overall economy, increasing purchase power and GDP.

Employment for Local People: According to the study and discussion with project authority if the project is implemented, about 2, 00,000 jobs will be created in the area under the influence of the project. It should be noted that employment opportunities will be created for both men and women.

The project investments would contribute to eradicating poverty by promoting the expansion of employment and business opportunities. Labour intensive technologies would be adopted during the construction phase which would create short-term employment opportunities for skilled and unskilled labour force. Long-term employment opportunities would subsequently be created during project's operations phase .

Development of Tourism: It can be hoped that the bridge over Meghna River would boost tourism and take it into a new level, as connectivity between not only two districts but also travelling people from capital to other districts would become easier. It can be proposed to build international standard amusement parks as well as five-star hotels, motels, resorts, museums and many more for recreation on the bank of the Meghna river
The bridge proposed is a Cable stayed bridge which is unique in Bangladesh. Hence people from other parts of the country will visit the place to see this type of bridge and enjoy crossing the bridge.

Transportation Enhancement: As part of the development of the roads connected to the proposed bridge, drainage improvements, construction of footpaths and installation of road lights will ensure safe movement.

The generalized cost of transportation using all the vehicles are going to be reduced. Easier communication would help expand education and training facilities, and the resulting skills development would ensure the availability of high-skilled workers. (Naher 2023)

Attaining Sustainable Development Goals: Based on different literature survey and consideribg location of the bridge and benefits of the bridge in terms of socioeconomic upliftment it is predicted that the proposed bridge project will help the Government of Bangladesh in attaining the following Sustainable Development Goals (SDGs) (Naher 2022) -

1. SDG 3: Ensure healthy lives and promote well-being for all at all ages.
2. SDG 5: Achieve gender equality and empower all women and girls.
3. SDG 6: Ensure availability and sustainable management of water and sanitation for all.
4. SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all.
5. SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
6. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster Innovation.
7. SDG 10: Reduce inequality within and among countries.
8. SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable.
9. SDG 12: Ensure sustainable consumption and production patterns.
10. SDG 13: Take urgent action to combat climate change and its impacts.
11. SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable Development.
12. SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Conclusion: The project has negative social Impact in terms of loss of 136.01 acres Agriculture land . The legal owners identified by DC will receive Cash Credit Limit including 200% premium or replacement land value, whichever is higher. The action plan also provisioned, if applicable, top-up payment to equalize gap between Cash Credit Limit and replacement costs Plus stamp duty & registration cost of land. It may be concluded that about 1.25 million population of surrounding four upazilas – Gazaria, Matlab Uttar, Matlab South (Dkhhin) and Chandpur sadar will be directly benefited by the bridge and about 7.75 millions of people of the two divisions will be indirectly benefitted.

Different literature study has established the fact that through the construction of the bridges in an region following regional as well as national development plan can be

achieved. Hence it may be concluded that the proposed bridge project in this area will be highly beneficial and it will improve the quality of life of the people of this region.

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