

Role of Micro-infrastructure in Achieving MDGs: An Analysis in line with Construction of Portable Steel Bridges in Rural Bangladesh

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[Micro-infrastructure has a significant impact on economic development of any country, which is a precondition for developing a good transport network. Physical infrastructure services directly affect socio-economic condition of the people and enhance entitlements of the poor. The objective of this particular paper is to investigate the links between construction of portable bridges as a case of micro-infrastructure in rural roads and human poverty reduction as well as human security enhancement in line with MDGs.]

I. Introduction

A good infrastructure is considered to be a pre-requisite for socio economic development of a nation. Physical infrastructure services directly affect socio-economic condition of the people and enhance entitlements of the poor. Construction of bridge has a significant impact on economic development and human development as well. Infrastructure development related to transport and communication is vital for a poor country. Better transport infrastructure promotes intra-national trade and could expand non-farm employment opportunities in rural areas (World Bank, 1994, 2004). For such a low-lying and riverine country like Bangladesh, construction of bridges is a precondition for developing a good transport network. Gannon and Liu (1997) argue that construction of a bridge in poorer regions reduces production and transaction costs. Besides, the land value of rural areas increases after the construction of bridge or culvert. Some people may temporarily lose their jobs due to the construction of bridges. For example, boatmen engaged in river-crossing have to lose their occupation after the construction of culverts and

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bridges. However, if construction of culverts and bridges promotes growth of the local economy, the process of job shrinkage or loss will be offset by the creation of employment in other sectors (in Calderon and Serven, 2004). In addition, better communication could enhance school enrolment and health status of the poor more than it does for the better off. Leipziger et al. (2003) point out that primary education improvement in a particular country may well depend on better transportation networks in rural areas.

In Bangladesh, more than 80% of the population lives in rural areas and it is primarily a land of water where rivers, canals and other bodies of water characterize the landscape. Since the main source of income for the country is agricultural production, and the distribution of products critically depends on land routes, inland transport systems are crucial for the socio-economic development of the country. However, given the poor condition of the rural roads, often it is difficult to transport the production across villages and into cities. This is especially true in the rainy season when most of the unpaved roads are unpaved become muddy and almost unsuitable for even walking. Moreover, massive floods and heavy rains often destroy the existing infrastructure, such as bridges along the rural roads. Poor road conditions along with lack of bridges over the rivers, canals, and channels make infrastructural development a big challenge for Bangladesh.

Under the above circumstances, it is important for development agencies to focus on more effective, stable and reliable communication and transportation network in Bangladesh. While the buildings of large bridges, involving massive investment, are preconditions for establishing the road network in many parts of Bangladesh, the rural transport system often can be greatly improved through the construction of simple portable steel bridges that will make it easier for villagers to travel from one place to another, and to transport their goods. Development agencies in Bangladesh, both local and international, have, therefore, taken initiatives to build small and portable steel bridges in many rural areas.

The objectives of this particular paper are to investigate the links between construction of bridges in rural roads and human poverty reduction as well as human security enhancement in line with MDGs. While Section I provides a brief introduction of the paper Section II deals with background of the construction of Portable Steel Bridges (PSBs) for rural roads in Bangladesh, Section III contextualizes how such construction of

Portable Steel Bridges (PSBs) is linked to MDGs and development, Section IV focuses on methodological issues and finally, Section V presents the major impacts of construction of Portable Steel Bridges (PSBs) in rural Bangladesh.

II. Construction of Portable Steel Bridges (PSBs) for Rural Roads in Bangladesh

“Construction of Portable Steel Bridges (PSBs) for Rural Roads in Bangladesh” has been implemented as a project (under Phase I & II) by Local Government and Engineering Department (LGED), Government of Bangladesh (GoB) with the financial assistance of the Government of Japan (GoJ). In Phase I, 74 bridges with total length of 3,445 meters were constructed during the period 1993 - 1997 at a cost of \1513 million Japanese grant covering 15 low-lying and flood-prone districts in Bangladesh. Construction of another set of 80 bridges with total length of 4,395 meters was completed later at a cost of \1819 million Japanese grant under Phase II (Government of Bangladesh, 2003).

Construction of bridges / culverts on rural roads is one of the policy objectives of every successive government in Bangladesh. Government of Bangladesh through LGED designed and implemented a Flood Rehabilitation Project after the 1987-1988 devastating floods that destroyed good portions of feeder and rural road networks. The main goal of the project was to rehabilitate the roads and bridges that were severely damaged by the floods and were further damaged by the 1991 cyclones and tidal surges. Under the circumstances GoB placed a request to GoJ for their grant aid assistance by providing portable steel bridge materials, necessary erection tools and training. In this backdrop, JICA conducted a basic design study for the project in 1993 where 74 bridges (3445m) were selected under phase I along the feeder roads (Type-B) located in the rural areas covering 15 districts in eastern part of the country (Crown Agents, 2003). The selection criteria included factors such as, appropriateness, necessity, socio-economic effects, priority etc. Most of the bridges selected under the project were either the new ones over the rivers/canals, or replaced the old ones, which were damaged or washed away by the floods or tidal surges. The bridges were constructed between the periods of 1993 to 1997 and maintained by LGED while GoJ provided the steel super materials with some required erection tools and on-job training on erection work of steel super structures.

The Fifth Five Year Plan (1997-2002) of Bangladesh emphasized on improving local transportation infrastructure including roads and bridges for connecting major towns in local areas. Hence, again under Phase II,

after approval of a Project Concept Paper by the Executive Committee of the National Economic Council (ECNEC) on May 19, 1999 and signing of three Exchange Notes between GoB and GoJ, 4395 meters of portable steel materials for construction of 80 bridges have been provided by the Japanese Government. The construction of these bridges has also been implemented and maintained by the LGED.

II. Contextualization: how Construction of Portable Steel Bridges (PSBs) for Rural Roads in Bangladesh is related to MDGs and development:

Millennium Development Goals (MDGs) were announced in September 2000 at the Millennium Summit by the member states of the United Nations, committing themselves to a series of targets, most of which are to be achieved by 2015. Accordingly, Bangladesh has set the MDGs in the perspective of economic growth, poverty reduction and social development that have been reflected in the Poverty Reduction Strategy Paper (PRSP) prepared in 2005. The construction of portable steel bridges in the rural roads of Bangladesh may help attaining a number of MDGs such as reducing poverty, achieving universal primary education, promoting gender equality and empowering women and improving maternal and child health etc. though indirectly. The construction of the PSBs may bring positive results for the villagers through improvements in their daily life activities. Some of the immediate impact of constructing the PSBs are improvement of communication and transportation convenience, safety and reliability, lessening travel time, increasing income level of the rural people by increasing their access to markets and higher agricultural production, increasing school enrolment and attendance for children, enhancing access to improved medical treatment, promotion of trading and small businesses and industries as well as generating employment opportunities for villagers.

III. Methodology to assess the impact of constructing Portable Steel Bridges (PSBs) on MDGs:

The methodological tools used to assess the impact of constructing Portable Steel Bridges (PSBs) included interviewing and the use of formal questionnaires for the *Upazila* (sub-districts) officers of LGED, focus group discussions with direct and indirect beneficiaries of the project, direct observations, and case studies. The target group for the study included local villagers engaged in production, transports, other business and services and the local government representatives. Project

sites were considered as the focus of the study. For the selection of project sites, a detailed list project sites was collected from LGED and then five of them were selected randomly covering two *Upazilas* at Savar (three bridges) from Dhaka division and Chandina (two bridges) from Chittagong division. Before designing the questionnaire and checklist for the study, all five sites were visited and closely observed. Local people and LGED officers have been discussed with regard to know the direct and indirect impacts of the bridges, their operations and maintenance etc. Finally, two sites were selected for evaluation, one from each *Upazila*.

For the study, two different sets of questionnaire/checklist were prepared, one for the beneficiaries and other for the concerned *Upazila* LGED officials. The questions included in the questionnaire/checklist were both structured as well as open-ended. As a result, the questions were suitable for recording both quantitative and qualitative information. Separate checklists were also prepared for the female respondents.

A traffic movement survey in each site was conducted to generate statistical information on traffic flow for quantitative analysis of constructing Portable Steel Bridges (PSBs) impacts and effects.

Two separate FGDs for male and female beneficiaries in each of the sites were conducted involving (1) local government representatives (Union Parishad chairman/members), (2) school head master/teachers, (3) a group of stakeholders comprising of the parents of students, community leaders, extremely poor households, farmers, day labours, traders, garments workers etc. The discussions were moderated using a pre-designed checklist and detailed notes on them were taken. During the FGDs, a careful attention was given particularly to the female participants so that maximum participation of individual members could be ensured.

Besides, primary and secondary enrolment and attendance rates were collected from the concerned school records to have a comparative picture before and after construction of bridges.

IV. Major impacts of the construction of Portable Steel Bridges (PSBs) in rural Bangladesh:

Improved Communication and Convenient Transport

No survey data on traffic movement over these bridges is available so far to compare the flow of movement before and after construction of bridges. With a view to have some quantitative information, a traffic movement survey was conducted in both sites and the results of which

are presented in Table 1. The data for before construction of bridges are based on the perception of the FGD participants. The information has been collected through personal interviews and median result has been reported thereafter.

Table 1: Flow of Traffic/People over the bridge daily from 7 am to 7 pm

Traffic/People	Savar		Chandina	
	Before bridge (based on the perception of the interviewees)	After bridge (based on actual observation for a whole day from 7 a.m. to 7 p.m.)	Before bridge (based on the perception of the interviewees)	After bridge (based on actual observation for a whole day from 7 a.m. to 7 p.m.)
Male	509	2320	452	2160
Female	66	567	42	341
Student (boys)	17	258	15	114
Student (girls)	02	168	12	120
Children	22	260	18	218
Aged Male	08	116	10	168
Aged female	02	78	04	111
Patient	02	6	03	14
Bicycle	07	54	02	130
Motorbike	0	18	0	14
Van	0	37	0	28
Rickshaw	0	580	0	519
Hawker	02	14	0	18
Pickup van	0	08	0	05
Cow	0	04	0	08
Goat	0	17	0	22
Private car	0	3	0	0
Truck	0	6	0	0

Note: Children = age below 18, aged = above 60

Table 1 shows that due to the PSBs, traffic and people movement increased substantially. As it can be estimated that by and large people's movement over the bridges increased by 4 to 5 times and the movement of female residents increased by nearly ten times. Previously trucks and vans carrying goods, 3 wheeler auto-rickshaws, private cars etc. could not enter into the villages. Now increase in traffic has also resulted in more shops and greater access to markets for the villagers, increase in production activities, school attendances, health services etc.

After the construction of the bridge and improvement of roads, 500/600 rickshaws, most popular vehicle in the rural area, are passing through the road. Besides, auto-rickshaws, ambulances etc. are also available for emergency case. Pickup vans, vans, trolleys are also available for transportation of goods.

Safety, Reliability, Less Travel Time and Cost

In Chandina, before the portable steel bridge was built the wooden bridge was weak and unsafe for traveling, especially with bigger vehicles. This exposed people to dangers especially in rainy seasons when crossing the rivers small boats very often capsized. In Savar, people had to depend on boats for crossing river before the construction of bridge, which was time consuming and even costlier. Sometimes, boats were not available from the late afternoon. Construction of portable steel bridge made the travel easier even during the evenings and nights.

This has enhanced mobility of the villagers with a positive impact on their livelihoods. Table 2 presents a comparative picture before and after construction of bridge with regard to time and cost for going to nearest school, hospital and market in Savar site.

Table 2: Time and cost required before and after completion of bridges to go to nearest school, hospital and local market in Savar site

Sites	Time (Minutes)		Cost (Tk.)	
	Before	After	Before	After
Nearest high school	60	15	15	5
Nearest hospital	75	22	20	7
Nearest Market	60	15	15	5

The above Table 2 shows that people had to spend roughly four times more time and three times more money before construction of bridge in Savar site. The same trend has also been observed in Chandina site.

Access to Markets and Promotion of Agricultural Products

Accesses to markets have definitely improved due to the construction of PSBs. There has been an increase in new markets as a result of frequent visits to markets by villagers. Besides, the number of visitors, traders, hawkers has increased due to the improved communication infrastructure and even goods are available at home.

Furthermore, production related procurement and marketing activities can now be carried out faster and traveling time has been reduced. This has increased efficiency in production related activities. It has become easier for farmers to transport their produces to cold storages and other places as well.

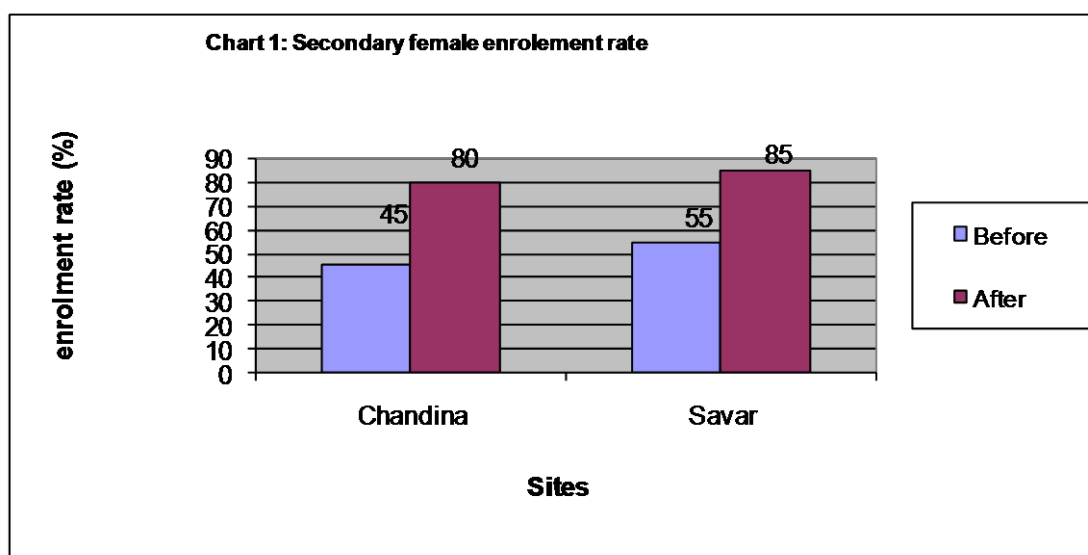
Trade and business, especially small business, have improved rapidly after the construction of the bridge. A number of new shops have been established beside the roads in about 2/3 km area near the bridge in Chandina. Moreover, a new market place named *Anandabazaar* has been established in that area. The local people informed that business and commerce are expanding and new shops are opening up due to the improved transportation facilities of goods, reduction of transportation

time and cost and 24 -hours transportation facilities created by the construction of the bridge.

Increased School Enrolment

Due to the better communication through the construction of bridges, school enrolment rate has increased significantly for the children in the areas near the PSBs. Before the construction of the bridge parents were afraid of sending their children, particularly daughters to school due to risk of crossing river by boat as well as for insecurity in road etc. As a result, secondary enrolment rate of female students was very low in comparison with male students as there is no high school in the backward side of the river. However, though primary enrolment rate remains almost same after construction of bridge, secondary school enrolment rate has increased substantially from around 50 percent to nearly 80 percent and drop out rate decreased sharply to below 10 percent from a high level of 50 percent.

The most significant progress has been observed in secondary school enrolment of female students as shown in figure 1.



A number of schools closed to PSBs have been visited during the survey and data on school enrolment rate, attendance rate, completion rate have been collected from the school records to have a comparative picture before and after construction of bridges. Chart 1 shows that secondary enrolment rate has increased sharply in both sites after construction of bridges. Another positive impact has been starting of school vans along these routes to help children come to school and go home at the end of the day. This has helped develop a new livelihood option for a number of poor households.

Improved Access to medical treatment

Before the bridges, it was difficult for many to access emergency medical treatment as road conditions and access to bridges were poor. It was very

difficult to take sick people to the hospitals in the urban areas. Due to the bridge and road facilities, the health services especially the reproductive health services of this area have improved. Pregnant women can now avail rickshaw, van and even ambulance for going to doctors. It has been reported that the maternal mortality, infant mortality of this region have been reduced significantly and the services related to reproductive health care have also been improved.

The activity of family planning workers, health workers and private doctors has increased significantly due to the improved communication facilities. Previously, they seldom went to the village. The villagers had to pay high fees to the doctors in case of home visits. Now doctors are interested to visit patients' home. Patients too can go to doctors if needed.

In Savar site, there is no health clinic in the villages located in the north side of the river. People of these villages have to depend on the health clinic of Kunda Bazaar located in the southern side of the river. It has been reported that many pregnant women died for not being able to reach the health clinic in time before the construction of bridge. Consequently, infant and maternal mortality rates were very high before the project. After the construction of the bridge patients can now easily go to Kunda bazaar health clinic- even they can go to Savar and Dhaka quickly. This has helped achieve low maternal mortality rate in that region.

Besides, the awareness of women about hygiene, pure drinking water and sanitation, reproductive health, care of pregnant women, danger of AIDS has also increased as the health workers now visit the villages more frequently.

Promotion of Trading and Business

During the period following the construction of bridge, one dairy farm, one poultry farm and one nursery have been established in Savar site. Approximately 30/40 households related to these farms have got an opportunity to enhance their income generating capacities.

Farmers, especially small and marginal farmers who earn their livelihoods by producing vegetables in small land have been able to increase their income after construction of bridge due to the fact that it is now possible for them to send perishable goods to *Kawran bazaar, Savar* and *Kunda Bazaar* quickly by pick up van, van, rickshaws etc. Consequently, farmers could save their time and money for better transportation facilities. Mobility of both persons and goods has significantly increased after the construction of this bridge.

Besides, roughly 10/12 new fisheries projects have started in different villages near the road after construction of bridge and improvement of the road infrastructure. Collection of fish fries, fish-food and marketing of the fish have become easier. The income of 70/80 families has been increased due to these new projects and expansion of existing projects.

The increase of fish production has helped improve the nutritional status of the people in general and the pregnant women and children, in particular.

Empowerment of women

It has been reported that women in the surveyed areas are mostly conservative and before the bridges, their social mobility was limited. However, the mobility of women has increased manifold due to the construction of the bridge. With the improvement in communications, women have become more visible in public spaces as well. They are shopping and traveling to other villages more frequently. Now women can easily move and go safely to clinics/hospitals, markets and house of the relatives. Moreover, they can purchase different daily necessities from newly established local shops in absence of their male counterparts according to their choices.

Previously, women had to take the help of the male members of their families to go to these places. Now women can easily go to these places by rickshaws or walking.

The bridge has also been playing a pivotal role by ensuring women's participation in income generating activities. In Savar project site, as many as 60/70 women used to work in the garments industry located in Savar and Hemayetpur before construction of the bridge. Now they can go to the garments by rickshaws and return home safely after completion of work. A small number of rickshaws were available before the construction of the bridge. The rickshaw-fare was also high at that time. Besides, they had to live in messes as it was not possible for them to go to work place from their home due to the terrible communication system. Many parents did not like to keep their daughters alone in the garments area. Under the circumstances, people dared not to send their daughters to work in the garments industry despite suffering from abject poverty. But they can now do everything now by staying at their home after construction of bridge. Subsequently, they can save even as they need not pay for lodging. They can retain more for their private consumption. Currently, around 300 women of the project site are working in the garments and return home safely after working hours even at night.

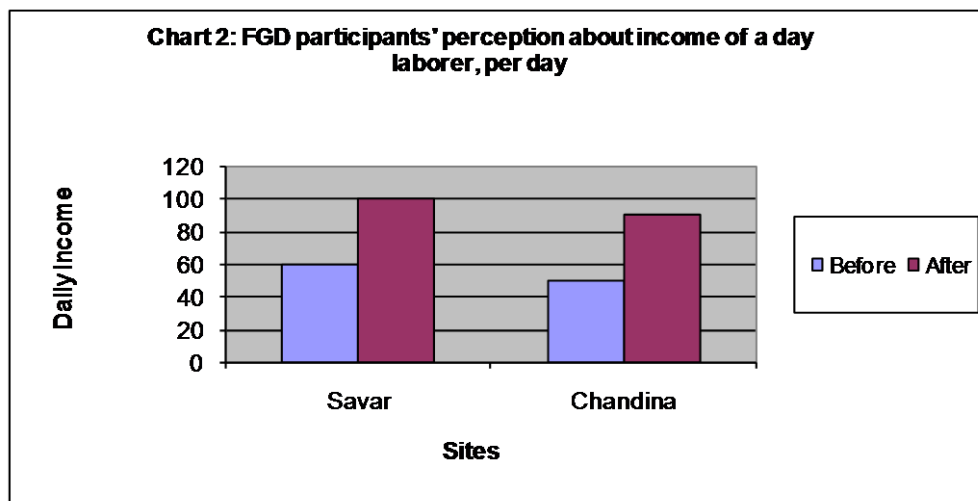
According to the garments workers, they can move freely now, their parents, children and husbands are happy by their earnings. Due to the improvement of the communication system, they can move alone without taking help from the male.

Increased livelihood

Though 10/15 boatmen have lost their occupation after the construction of the bridge at Savar site, all of them are now engaged in other occupations (e.g. rickshaw puller/day labor) and they found no significant difference between their past and present income. However, after

construction of bridge in Chandina site, approximately 400 people of 10/12 villages have started earning their livelihoods by pulling rickshaw. A significant portion of these people used to pull rickshaw in *Chandina town*, Comilla, Chittagong and Noakhali before construction of the bridge. Some of them also worked as day laborers. Those who used to work outside their village, they had to spend a large portion of their income for accommodation and food and they were lying below the poverty line. Now they can work in their locality and need not pay for accommodation. It has been reported that they can even save from their income and thus came out of poverty after construction of bridge.

Again after construction of the bridge in Savar site, around 500 people have been earning their livelihoods by driving trucks, pickup vans, pulling rickshaws and vans (10/12 rickshaws/vans before). Most of them were farmers or day laborers before. They were jobless for more than 3/4 months during rainy season and flood. They had to migrate to other regions for work at that time. Now they need not migrate anymore and can work round the year in their own locality. Instead people from other regions come here for work. In addition, they are paid more now than what they used to get before. The following graph shows a comparative picture of daily income of a day laborer.



The chart 2 shows that the income of the labors increased sharply, almost doubled, due to the construction of bridge.

Price Stabilization

With the introduction of new markets and increased availability, prices in the markets have stabilized and this in turn has helped the producers improve their businesses considerably. In the past, prices were highly unstable and fluctuated sharply due to unavailability of goods.

Expansion of NGO activities

The activities of NGOs in credit schemes have increased after bridge construction. Large NGOs like ASA, BRAC, Grameen Bank, Proshika

are now operating credit programs in such remote villages. They were not in operation earlier. It is evident that the hunger and poverty among the poor villagers have been reduced due to the expansion micro credit programs.

Increased in-migration and land value

New settlements are coming more in number in the region due to in-migration after the improvement of communication system. The workers engaged in transport sector are living temporarily or permanently in this region. So the land value of the areas has increased considerably. Housing businesses and other related trade activities have also been expanded due to the increased demand generated by housing and transport workers resulting overall economic development of the regions.

Increased access of government officials

Rural villages are now connected with Union Parishad, *Upazila*, District and the Capital city through the construction of portable bridges. Frequent visits of the government officials such as *Upazila Nirbahi Officer*, Block Supervisors, LGED Engineers, health worker, family planning activists from *Upazila* Head Quarter increased substantially to the villages after construction of the bridge. Earlier, they could hardly visit the local area due to lack of good transportation system.

Sense of Security

Human security increased rapidly after the construction of the bridge as follows:

- an opportunity to get emergency treatment for maternal/child diseases, heart attack, stroke, appendix etc. has been created. So the number of deaths caused by these diseases has been reduced and people are feeling safer.
- the insecurities of female students due to walking on foot and crossing river by boats have been reduced. Now they can travel by rickshaw/van quickly for their destination.
- women can travel safely from dawn to the midnight. They can go to work place from home and becoming self-reliant day by day. They can go to markets and buy commodities of their choices without the help of their male members.
- police surveillance in the region has increased after the construction of the bridge. So the law and order situation improved rapidly.

Finally, it can be said that construction of portable steel bridges played a significant role to attain major goals of MDGs like reducing poverty and hunger, increasing school enrolment rate, reducing gender disparity and decreasing maternal and child mortality.

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