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Economy awaits massive boost as disconnect with southwest goes

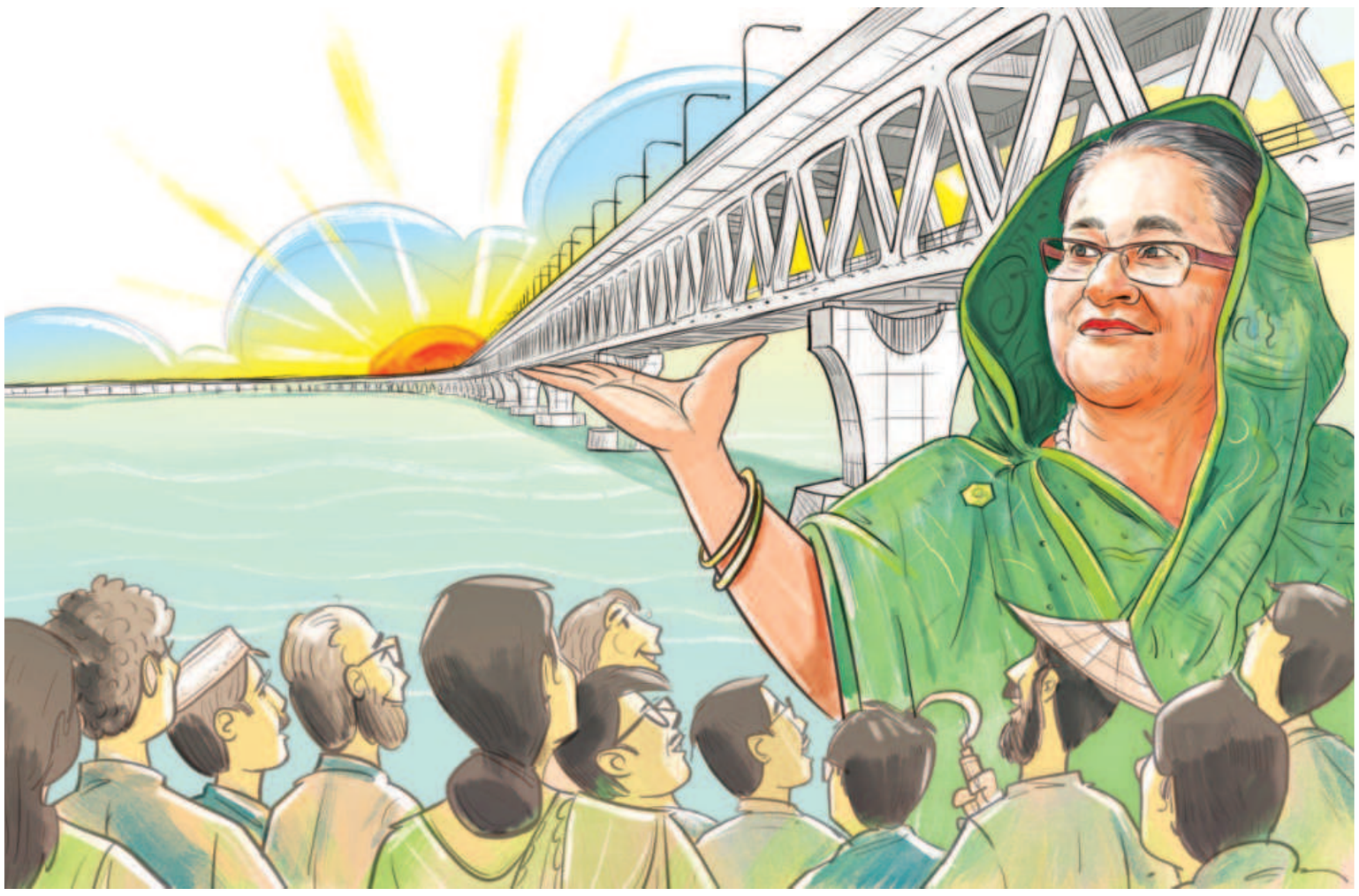

ILLUSTRATION: **BIPLOB CHAKROBORTY**

REJAUL KARIM BYRON

When it comes to high achievement, it is almost always fuelled by high expectations. Going by that thinking, the much-awaited Padma bridge, whose inauguration takes place today, is gearing to be a high achiever when it comes to economic benefits.

Constructed at a cost of about Tk 30,193 crore, the 6.15-kilometre-long bridge will be connecting the backward southwest region with the rest of the country.

In so doing, it would be adding 1.2 percent to 1.7 percent to Bangladesh's GDP every year, and the southwest region's GDP by as much as 35 percent -- and this is no little achievement.

At least 30 million people, almost one-fifth of the country's total population, will directly benefit from the bridge, set to be the largest in Bangladesh, according to a study by the World Bank.

As with the Jamuna bridge, positive impacts are expected on poverty alleviation in the southwest region, particularly in Khulna and Barishal divisions.

"There would be both tangible and intangible benefits," said Mustafizur Rahman, distinguished fellow of the Centre for Policy Dialogue.

The intangible benefit comes in the form of economic pride that this bridge on Padma River has come to represent.

Originally planned to be built with funding from the World Bank, the Washington-based multilateral lender in 2012 pulled out from the project on allegations of corruption, which were later found to be not true.

Constructed at a cost of about Tk 30,193 crore, the 6.15-kilometre-long bridge will be connecting the backward southwest region with the rest of the country. In so doing, it would be adding 1.2 percent to 1.7 percent to Bangladesh's GDP every year.

But this did not dither Prime Minister Sheikh Hasina from the goal, which was to build an integrated and well-connected economy to match the country's aspirations of becoming an advanced nation by 2041.

She decided to build the bridge with the government's own funding and delivered on that proclamation.

"This is a great confidence booster for the country," Rahman said.

It will help in the country's branding as an emerging economic force to reckon with, improve the international credit rating and change the perception of Bangladesh in the world.

Furthermore, it led to both capital and human capital development.

"All of it will have a positive role in future.

SEE PAGE 2


PHOTO: COLLECTED

BUILT BY BANGLADESH

FROM PAGE 1

We cannot see them now but these will have some monetary value in future," he said.

The tangible benefits would come in the lessening of travel time between the Dhaka division and the southwest region and possibly on to India.

Travel time savings are expected to be about two hours for cars and buses and more than 10 hours for trucks.

This will bring down the cost of passenger and commodity movement, vehicle operation and maintenance costs and reduce the wasteful burning of fossil fuels.

"A neglected region will get connected to the mainstream economy. This will play a positive role in inclusive development," Rahman said, adding that there would be visible impacts on marketing, distribution, efficiency and timeliness of delivery of consignments from the region.

The market for perishables from the southwest region will widen as truckers would be able to carry the produce to Dhaka on the same day, said Zahid Hussain, a former lead economist of the World Bank's Dhaka office.

That also means the farmers and fishermen would get better prices.

"This will work as an incentive for them to scale up their production."

In other words, the bridge will yield an agricultural boost.

Inter-district commerce would grow too.

"From commerce, the focus would then shift to production. You increase your production by investing."

Given the backward nature of the region, land availability is easier, still.

Getting workable land near Dhaka or Chittagong is hard and costly. But the land prices in the Khulna region are still reasonable, Hussain said.

"Since connectivity is no longer an issue, investment interest will increase. Even if there is no improvement in the regulatory environment, there would still be benefits," Hussain said.

Because of the superlative connectivity thanks to the Padma bridge, the Payra deep seaport and the Mongla port would become viable too, according to Rahman.

The bridge would also serve as a transmission channel for gas and electricity.

"Economic benefits would come in many ways," said Ahsan H Mansur, executive director of Policy Research Institute.

The southwest region is home to the Sundarbans and Kuakata, two tourist attractions that are not easily accessible.

"A tourism industry will burgeon based on the Padma bridge. People would come to see the Padma bridge and also go forth to the Sundarbans," Hussain said.

However, for the Padma bridge to be truly epoch-making, the southwest region needs to be transformed into an economic corridor.

"The benefits will multiply then," Rahman said.

For that, the planned special economic zones must have a good service delivery, a conducive business environment and skilled manpower.

"Only then would the investment flow in -- we must pay attention to this. Parallel initiatives are necessary too to get the full benefits," Rahman added.

Hussain said the economic incentives to fix the existing problems for border trade issues including custom procedural harmonisation have vastly improved.

There are good chances of investment flowing in from India because of its proximity to the neighbouring country, according to Mansur.

"If the government can implement the economic corridors planned, this area can be revitalised. This will have a serious impact, which will be hard to quantify now," he added.

Massive shot in railway's arm

FROM PAGE 3

Currently, freight trains from India come up to Noapara of Jashore, he said, adding that once the Dhaka-Mawa-Jashore line comes into operation, those trains would come to Dhaka directly, which will ultimately increase cross-border transportation.

"It wouldn't have been possible to expand the rail network in the southwestern region had the bridge not been constructed," said Afzal, adding that Padma bridge will play a great role in railway expansion.

Prof Hadiuzzman said the bridge will facilitate Bangladesh Railway to bring two sea ports -- Mongla and Payra -- under its network while Chattogram Port is already connected with the railway.

Bangladesh Railway is currently implementing a project to link Mongla with Khulna and has plans to build a line to connect Payra.

This way, the three ports and the capital would come under a strong railway network and create a huge opportunity for Bangladesh Railway to increase its freight transportation many folds, which is a step that could help the state-run transport agency reduce the gap in its income and operation costs, Hadiuzzaman said.

However, to reap the benefits from the connectivity, Bangladesh Railway has to build two ICDs near Dhaka, preferably in the south of Dhaka city, to facilitate the shifting of containers.

"If all these can be done on time, then the railway will see a paradigm shift," he added.

Following Bangladesh Railway's request, the Economic and Social Commission for Asia and the Pacific (ESCAP), a regional office of the UN, agreed to incorporate the Dhaka-Bhanga-Jashore route as a part of the Trans-Asian Railway (TAR) Network.

The TAR is a regional transport cooperation platform aimed at enhancing the efficiency and development of the railway infrastructure in Asia, according to ESCAP.

The network now comprises approximately 125,500 km of railway lines serving 28 member countries.

Bangladesh Railway has to do many things, including gauge conversion from Meter Gauge to Broad Gauge, to establish effective connectivity with the TAR, in which Bangladesh is a signatory, Hadiuzzaman said.

OTHER EXPANSION PLANS

To take benefits of the bridge, Bangladesh Railway has a plan for a project -- the Bhanga-Payra Rail Link -- which would create the scope for expanding rail networks in Barishal division -- crisscrossed by rivers -- earlier thought to be too challenging logistically.

Bangladesh Railway has already completed a feasibility study and detailed design of the rail line from Bhanga to Payra port in Patuakhali via Barishal.

The 214 km line, which will have 19 stations, will cost around Tk 41,797.6 crore, or $4.93 billion. The proposed deadline of the project is June 2029.

The rail authorities are now searching for funding for the project, which once implemented, Barishal and Patuakhali will directly come under the rail network and several other southern districts will also benefit from it.

Besides, Bangladesh Railway is implementing a project for construction of Khulna-Mongla port rail line, to connect the country's second seaport with the rail network. The Tk 3,801.61 crore project is expected to be completed within this year.

It has also undertaken a project to connect Magura with the railway network. Physical works of the project, titled "Construction of broad-gauge rail line from Madhukhali to Magura Via Kamarkhali", began last year. The cost of the project is Tk 1,202 crore and expected to be completed within April 2024.

A feasibility study for the construction of a rail line from Darshana to Meherpur via Damurhuda and Mujibnagar has already been completed and the project would cost around Tk 2,000 crore.

Massive shot in railway's arm

TUHIN SHUBHRA ADHIKARY

Thanks to the opening of the Padma bridge today, the people and businesses in south-western regions of Bangladesh will finally have road access to the rest of the country.

However, they will have to wait a little bit longer to make use of the railway system being built on the multipurpose bridge, which is the largest in Bangladesh.

If you want to go to Jashore from Dhaka by train, you currently have to spend around 10 hours to travel the 480-kilometre (km) distance, which includes a stretch through the Bangabandhu Bridge on Jamuna River.

But once the Padma bridge opens and the under-construction rail line from Dhaka to Jashore via the bridge becomes functional, the distance would decrease by 200 km and cut the travel time in half.

PHOTO: SAJJAD HOSSAIN

The much-awaited bridge will play a greater role in expanding the rail network in south-western parts of Bangladesh.

The double-decker bridge with road and rail facilities will create a scope to link around a dozen new districts by railway, which will help implement the government's plans to bring the entire country under the rail network.

Besides, the bridge will create strong railway connectivity among the capital and three sea ports --Chattogram, Mongla and the under-construction Payra port -- and give a boost to freight transportation.

It will also help establish a link with the Trans-Asian Railway Network and boost cross-border railway operations for both passenger and freight trains.

"The bridge will work as a transformational structure for the expansion of the country's rail network and open new windows in this regard," said Prof M Hadiuzzaman, director of the accident research institute at the Bangladesh University of Engineering and Technology.

However, he said Bangladesh Railway has to develop some crucial structures, including the rail lines and inland container depots (ICD), to reap the benefits of the bridge.

Bangladesh Railway has already undertaken a project, styled "Padma Bridge Rail Link Project (PBRLP)", to connect Dhaka and Jashore with a 169 km rail line via the bridge.

Padma Bridge Rail Link Project will also help establish a link with the Trans-Asian Railway Network and boost cross-border railway operations for both passenger and freight trains.

IMPACT OF PADMA BRIDGE

Currently, Bangladesh Railway has a rail network across 44 districts and as per its 30-year master plan (2016-2045), all districts sans Bhola -- the country's lone island district -- will be brought under the network.

The government undertook the Padma Bridge Rail Link Project (PBRLP) in 2016 to build a rail line between Dhaka and Jashore through Padma bridge.

Physical work of the Tk 39,246 crore project started in July 2018 and the overall progress was 57.5 per cent as of April this year.

The authorities expect to start rail operations from Dhaka to Bhanga, which is already connected with the rail network via Faridpur, within June next year while the full line would be operational by 2024.

The rail line will reduce the travel distance between Dhaka and Jashore by more than 185 km, Dhaka-Khulna by 212 km and Dhaka-Darshana by 44 km, shows a project document.

The new line will connect four districts -- Munshiganj, Shariatpur, Madaripur and Narail -- with the country's growing rail network, officials said.

Currently, Khulna is linked with Dhaka by a rail line through Bangabandhu Bridge, which takes more than 10 hours, not only for distance but also for speed restrictions on the bridge and lack of track capacity.

"The journey time would be reduced by four to five hours once the direct line via Padma Bridge is operational," Afzal Hossain, project director of PBRLP, told The Daily Star recently.

All the trains that now operate via Bangabandhu Bridge will be operated via Padma Bridge upon completion of the line by 2024 as expected, he said.

Besides, the bridge would create a scope for operating inter-city trains between Dhaka-Gopalganj, Dhaka-Faridpur and Dhaka-Magura, the railway engineer said.

SEE PAGE 2

"We invented 13 new technologies in the process of constructing the Padma Bridge"

Leaving behind all odds, Padma Bridge, the largest bridge in Bangladesh and the first multi-billion-dollar project of its kind to be financed by the peoples' money, is a reality today. This tells of the country's inner strength. The main works of Padma Bridge were done by the China Railway Major Bridge Engineering Group Co Ltd (MBEC). How did it undertake such a gigantic and challenging job requiring unique engineering? A MBEC senior engineer shared the experience in a recent interview with The Daily Star's Porimol Palma. The MBEC official preferred not to be named.

The Padma Bridge project is unique because of its greater significance to the people of Bangladesh, its economy and not to mention, the difficult construction technologies, the challenging construction environment requiring high levels of skill and efficiency and finally, the time it took to complete.

A Chinese technician operating a heavy machine at the Padma Bridge construction site. Source: Xinhua.

The Daily Star (TDS): *When did you think of bidding for the project and how did you win it?*

MBEC: In the year 2000, our company came to Bangladesh to construct the Paksey Bridge. That was when we came to know that the Bangladesh government was planning another major bridge on the Padma River. That excited us since our company constructed the Wuhan Yangtze River Bridge, the first road-cum-rail bridge over the Yangtze River. We were eager to construct another historic bridge in a foreign country as the national team of bridge construction in China, and for over 10 years, we had been tracking information related to the project. So, we were fully prepared to win the bid. More importantly, we had successfully constructed the Paksey Bridge, the 3rd Karnaphuli Bridge, Kuril Flyover and Dapdapia Bridge in Bangladesh.

TDS: *What was your impression after getting the work?*

MBEC: I remember being quite excited. However, the feeling did not last very long as I soon realised that the work would be quite challenging. So, I immediately devoted myself to preparing for the project. We signed the contract with the Bangladesh Bridge Authority (BBA) in June 2014 and our first batch of staff was deployed to the site in July.

TDS: *What preparations did you have to take before starting the work? What difficulties did you face in the initial stages?*

MBEC: First, we prepared the project management plan and sorted out all the necessary sources for the project construction yard. Then, we completed the deployment of personnel within a month. A large amount of special construction equipment was mobilised to the project site before the authorities issued orders for work commencement. In the initial stage, we had a lot of challenges. For example, with inclines and because of unforeseeable soil conditions, it was extremely difficult to use long pile drivers for the foundation. In addition, we suffered land collapse incidents several times during the monsoon season in 2015 and 2016 due to heavy floods and strong scour. Then, we had to mobilise a large number of personnel, geo-bags and sand to protect the embankment of the construction yard.

TDS: *Did you face any other challenges from logistic, social or government sides that could have been avoided?*

MBEC: We encountered almost all kinds of challenges. However, the Bangladesh Bridge Authority (BBA) and other government agencies always provided us with the best support whenever required. It is a little pity though that Chittagong Port was always congested while we imported large volumes of materials and equipment for project construction work. We had to spend long hours for customs clearance. In April 2020, the brackets of railway stringer beams were the most urgent material for the project but that was when the Covid-19 pandemic struck Bangladesh, prompting the government to impose a nationwide lockdown. To keep the work going, we decided to visit Chittagong Port and facilitate customs clearance. We immediately reported our plan to the BBA and received a special pass, so that our designated staff and cars could go to Chittagong Port smoothly. My staff stayed there for a few days and worked with the customs officials. That's how we received the brackets on time at the site.

TDS: *How did you manage to continue working during the peak of the Covid-19 pandemic?*

MBEC: In order to protect our staff, the most urgent issue was to prevent Covid-19 from spreading in the project area. This was particularly difficult at the time as no vaccines had been developed yet and people did not have a clear idea about the virus. Everyone was scared to go outside to work but against all odds, our construction continued. We shouldered the mission to construct the dream bridge as soon as we could. To overcome those difficulties, we enhanced the security work of our construction yard and increased the investment for Covid-19 containment. We strictly controlled the personnel movement at the main gate. We quickly established more than 40 dormitories at different places inside our construction yard as an accommodation area for more than 2,000 local employees, for free. We also paid them an additional daily living allowance, and provided medical face masks and other medical materials imported from China when the markets were closed in Bangladesh. With all our efforts, we tried hard to mitigate the impacts of the pandemic, moving forward in the process step by step.

TDS: *Do you think you could have done the work more quickly and efficiently?*

MBEC: There were lots of unpredictable and unprecedented challenges for the project. Such as the water velocity, the extremely bad weather, the Covid-19 pandemic and so on. For example, the Padma River has a mean flow of around 150,000 m3/second, making it one of the largest rivers in the world. This brought extreme challenges to the construction work. Extreme weather, such as hurricanes, lightning, heavy rain, and high temperatures frequently forced us to stop work at the site. In particular, the outbreak of Covid-19 severely affected the construction work. Despite it all, we believe that we made the most appropriate decision, took the most effective actions and made the best effort to achieve the best result.

TDS: *Do you want to make any comparison between construction of the Padma Bridge and any other mega projects anywhere in the world?*

MBEC: Like other mega projects in the world, the Padma Bridge is of great significance and requires large-scale construction. However, I would like to say this project is unique because of its greater significance to the people of Bangladesh, its economy and not to mention, the difficult construction technologies, the challenging construction environment requiring high levels of skill and efficiency and finally, the time it took to complete.

TDS: *What is your impression after completing the project?*

MBEC: I feel as if I have completed the most valuable work of my life.

TDS: *Is there anything new that you have achieved through completing this project?*

MBEC: Yes, there is. Technically speaking, we have invented 13 new technologies, such as construction technology of super-large diameters and super-long inclined steel pipe piles, integral manufacturing and hoisting technology of 150 metre-span steel truss, over 10,000-ton friction pendulum anti-seismic bearing technology and so on. With the successful application of these original technologies, we constructed Padma Bridge successfully.

TDS: *Is there any lesson that you want to share with the people and government?*

MBEC: Bangladesh is a country of hope with a huge potential for development. However, everybody has to understand that hard work, persistence and perseverance are always the basic elements to support continuous development.

"From engineering point of view, Padma Bridge is one of the most challenging projects in the world"

In conversation with National Professor Dr Jamilur Reza Choudhury

Prof. Jamilur Reza Choudhury inspecting the bridge construction activities.

Though the Padma Bridge project was supposed to end in four years, the contractors could not meet the deadline. It is also important to note that from engineering point of view, Padma Bridge is one of the most challenging projects in the world. We had to devise new construction techniques to cope with the unique geographical condition of the river.

River training is another key challenge to implement this project. Approximately USD 1 billion is being invested in river training works on Janjira and Mawa banks to hold the river in its current position.

The riverbed fluctuates a lot due to water flows. The riverbed may scour up to 62 metres or 200 ft. Therefore, we are building the foundation in such a way that it can sustain the load even if the riverbed scours down to 62 metres. We are also taking other disasters into consideration, such as earthquakes, cyclones, accidents like ship impact etc. So, it is crucial to make the foundation strong to carry the entire load of the bridge. We are using "steel piles" as foundation and driving those piles 124 metres deep into the riverbed.

The Padma Bridge was designed between 2010 and 2012. It was designed on the basis of soil test conducted during that period. Another round of soil test was carried out by the Contractor during the construction, and it was found that the soil under some piers was of different characteristics. Most of them are silt; some are sand and some are clay. We had to avoid resting the piles on clay as it would slip away under high pressure. It would put the whole structure at risk. Now our options were to either have the tip level above the clay layer or below the clay layer. Since it is nearly impossible to drive the piles below the clay layer, even using the strongest hammer available in the world, we have reduced the length of the piles and increased their numbers. Even after following this method, we figured out that some piers are unable to withstand the load. Hence, we had to resort to another new technology using some chemicals for grouting. Due to such redesigns and adjustments, the completion of this project is being delayed. However, the good news is that we have resolved all the challenges. We expect the bridge to open for vehicle movement by December 2020. Undoubtedly, the construction of Padma Bridge will significantly improve the communication network of the south-western districts which are now heavily dependent on ferry services.

The Padma Bridge Rail Link is another important initiative that will connect Dhaka and Jashore via the Padma Bridge. It will improve the railway connectivity of the south-western region of the country. Most of the funding is from loan from Chinese Government. Under the G2G process, there is no provision for competitive bidding. Therefore, it is difficult to find out the project costs if they are comparable to similar projects. One of my suggestions to the designers was to set up more rail stations in places in Bikrampur like Sirajdikhan, and Srinagar along the route up to Mawa, which are urbanizing rapidly. If the proposal is executed, many commuters would be able to travel to Dhaka every day from these places which will significantly reduce pressure on the capital city. However, this proposal has not been included in the project yet.

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Prof. Jamilur Reza Choudhury (1943- 2020) headed the International Panel of Experts for the Padma Multipurpose Bridge Project. The interview was taken by The Daily Star in July 2019.

"Padma Bridge, a testament to Bangladesh's confidence and dignity"

Padma Bridge has conquered political, financial and construction challenges, according to Prof Dr M Shamim Z Bosunia, a specialist in structural and concrete design who has been involved with the Padma Multipurpose Bridge project since its early stage. With the government set to officially open the country's largest bridge, Prof Bosunia, head of the project's panel of experts, recalled the challenges faced throughout the journey in an interview with The Daily Star's Priyam Paul.

Prof Dr M Shamim Z Bosunia

The Daily Star (TDS): *Why was the construction of Padma Bridge a hugely challenging task? How were the challenges overcome?*

Prof Bosunia: The laying of the first foundation stone took place in 2001 while a feasibility study was carried out in 2004. Initially, the challenges were of two types. One was the technical challenge involving designing and construction while the political dimension was another big issue. Three sites were short-listed for building the bridge and the current location was among them but the existing Dhaka-Mawa road worked as a key factor in the selection process.

The World Bank was helping us at the time but when the approach roads and other services and buildings were being built, the organisation suddenly came up with news that corruption had been committed. Our honourable prime minister vehemently denied the allegations and said the World Bank had to prove its claims. She then said the government no longer wanted the World Bank's money and it was later proven that no corruption had taken place.

But nonetheless, the work had come to a halt because of the allegation. In 2013, the honourable prime minister asked whether I would be able to start work on the bridge and I answered that if Prof Dr Jamilur Reza Choudhury was with us, then we would be able to do it.

So, we started the task of appointing a contractor. The supervision task was given to the army following a bid and in 2014, we awarded the work for the main bridge and river training. Still though, people pointed to the cost of the bridge, which needed around three lakh tonnes of steel and several billion cubic feet of concrete to build.

At current market prices, the materials would cost Tk 10,000 crore to Tk 12,000 crore while there are many other costs involved. I do not know how the initial estimate was made. The government also had to spend Tk 4,700 crore to acquire land while the value added tax on consulting fees amounted to Tk 3,000 crore.

So, one could not build the bridge for Tk 10,000 crore and costs went up later compared to the initial estimate. Besides, the bridge had to go through political, financial and construction challenges, which we have overcome. Now, we have come to the opening date.

TDS: *In terms of construction, is there any unique feature of the Padma Bridge compared to other mega bridges of the world?*

Prof Bosunia: Padma is a fast-flowing river, perhaps the second-fastest flowing river after the Amazon and there is too much sedimentation as well. When a pre-feasibility study was being carried out on the Mawa-Janjira site, soil tests were carried out throughout the route and we found that there was weak soil in some parts because of the presence of clay.

We deem clay as weak soil but this clay was very hard, not like the usual clay. Even then, as per engineering sciences, we did not build the piles where there is clay.

There are six piles, or steel foundations, under each pier. We added another pile under the piers for good measure even though foreign engineers said that using even six or seven piles would not make any difference. But we opposed their observation.

When they insisted on load testing the piles, we used a small pipe alongside the main pile to perform grouting. This method has not been used much in the case of bridges in other countries. Putting in place the bearing system in order to help the bridge withstand earthquakes was another challenge. The bearing absorbs horizontal movement of the structure. We have used it even though it has not been used much in other countries as it was only applied in recent years.

TDS: How do you evaluate the role of Bangladeshi engineers in the bridge's construction? How will the project help transfer knowledge and technology regarding the construction of mega-structures?

Prof Bosunia: Around 4,000 engineers worked on the Padma Multipurpose Bridge. Of them, more than 500 were Bangladeshi. When asked about the source of our courage to build the bridge in absence of foreign expertise and funds, we answered that there was nothing to be scared about. We followed the set criteria and in terms of education and knowledge, I don't think there is any dearth in any area.

Many teachers from the Bangladesh University of Engineering and Technology were involved in many large projects in other countries so we onboarded them as well. The most difficult challenge for construction was the lack of equipment. Many of our local contractors have brought in the equipment needed to construct roads, not large-scale bridges.

Now, our contractors and engineers will be able to build bridges like this. Five companies can join their hands together and bring in the necessary equipment. There is no logic why we can't do this. There is enough transfer of technical know-how and technology. The construction of Padma Bridge has given a huge boost to our confidence.

TDS: *Why has only one rail line been designed along with the Padma Bridge project?*

Prof Bosunia: Many argued that as Bangladesh is increasingly becoming a higher-income country, two rail lines would have been fine. But we have carried out a study keeping in mind the potential traffic scenario in coming decades.

Three trains will be able to cross the rail bridge in an hour, meaning that 72 trains can pass every day. But there are not enough passengers to fill more than five to seven of these trains. Besides, the main bridge would have to be broadened had we added another track, which would have raised costs further. Whenever a road or bridge is designed, we take into account the expected traffic. If there is no traffic, there is no point in widening them.

TDS: *Which steps are necessary to keep Padma Bridge safe in terms of maintenance, avoiding collisions with water vessels and climate change?*

Prof Bosunia: When the bridge was designed, longevity of 60 to 70 years was kept in mind. We are now saying it will last 100 years because a steel-made bridge is easy to maintain. The Hardinge Bridge is 107 years old while the Bhairab Bridge is close to 100 years and both were built using steel.

It is easy to protect steel-built bridges as the only problem is that they can rust. So, we have to take care to prevent it. The consultant has prepared guidelines on how to protect every structural element of the bridge for the Bangladesh Bridge Authority.

It is like a daily routine. If they follow that, there should not be any problem. So, the maintenance guidelines should be followed strictly. The bridge is made of steel but concrete was used to bear the load. Both reinforced concrete and pre-stressed concrete were used in the bridge, which was designed considering the highest flood levels of the past 100 to 200 years. There is no dearth from any technical point of view. We have tried our best with our knowledge to ensure quality.

PADMA BRIDGE FACT BOX

MAIN BRIDGE LENGTH 6.15 km

APPROACH ROAD 12.117 km

VIADUCT 3.148 km (ROAD), 532 m (RAIL)

BDT 30,193.39 crore Estimated Project Cost

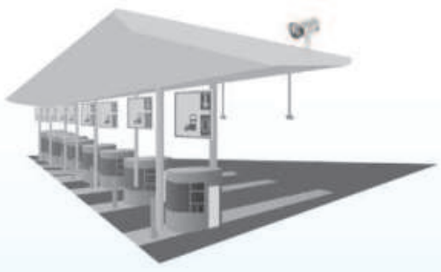
1471 hector Land Acquisition

RIVER TRAINING WORKS 14 KM
(1.6 Mawa + 12.4 in Janjira)

ROAD AND BRIDGE END FACILITY

Mawa End (North Bank)
> Length = 1.617 km
> 4-Lane Dual Carriageway
> Total Road with = 27.6m
> 2.141 km Service Road & 0.682 km local road
> Toll Plaza, Police Station, Service Area-01
> Weigh Station, Emergency Response Area etc.

Janjira End (South Bank)
> Length = 10.50 km
> 4-Lane Dual Carriageway
> Total Road with = 27.6m
> 5 nos. Bridge, 20 nos. Box Culvert, 8 nos. Underpasses
> 12km Service Road & 3km local road
> Toll Plaza, Police Station, Service Area-03,
> Weigh Station, Emergency Response Area etc.



PADMA BRIDGE TOLL RATES (BDT):

Motorcycle -100 Tk	Medium Bus -2,000 Tk
Car, Jeep - 750 Tk	Big Bus 2,400 Tk
Pickup van -1,200 Tk	Small Truck 1,600 Tk
Microbus -1,300 Tk	Medium Truck 2,100 Tk

IMPACT OF THE BRIDGE

> Direct road link between the capital and the southwest region, Mongla port
> Travel time between the capital and the southwest region to be reduced by one-fourth ; tourism to get a boost
> Being part of the proposed Asian Highway and Trans-Asian Railway Network, the bridge will facilitate regional connectivity
> **29%** growth in construction sector, **9.5%** in agriculture, **8%** in manufacturing and transport
> Poverty to drop by **1%** in the region, **0.8%** nationally
> GDP to groth by **1.7%** in southwest region, **0.56%** countrywide
> River training to save 9,000 hectares of land worth **$156** million from erosion and flooding
> **$400** million ferry service cost on Mawa-Janjira route to be saved

VEHICLES TO CROSS EVERY DAY

24,000 vehicles to cross every day (2022)

67,000 vehicles targeted to pass by 2050

UPPER DECK
22 m wide concrete deck slab (2.5 m hard shoulder on the both side) 4 Lane road

LOWER DECK
Single Track Dual Gauge Rail

Total Number of **PILLARS 42**

SPAN 41
2 transition pier at landward ends and 40 Center pier

SPAN LENGTH
150 m each Composite Superstructure (Warren type Steel Truss Girder and Concrete on Upper Deck)

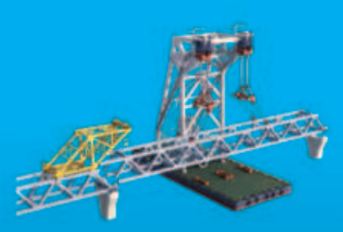
Navigational Clearance
18.30 M

PILE
> Racked (Inclined at 1H:6V) Steel Tubular driven pile
> 6 Nos. In each pier
> Pile Diameter = 3m
> Pile Length = 128m
> Number of Pile 272nos
> 40mm Rebar used in the Piles
> Total 132 nos Rebar used

13.6 M
Deck Height

VIADUCT
Mawa End (North Bank):
> 19+20 = 39 span; Length 1478.03m
Janjira End (South Bank):
> 23+19 = 42 span; Length 1670.03m

> Total Road Viaduct : 81 span
> Total Length=3148.06m
Rail Viaduct
Mawa End and Janjira End:
> 7+7 = 14 span; Length 532m



EXECUTING AGENCY
Bangladesh Bridge Authority (BBA)

MAIN BRIDGE WORKS
China Major Bridge Engineering Co. Ltd, China

Infographic Design:
Md. Akram Hossen, The Daily Star

"A transformational infrastructure"

In conversation with Communications Expert Professor Dr. Md. Shamsul Hoque

The Daily Star (TDS): *What possible changes could there be in our national transport system after the inauguration of the Padma Multipurpose Bridge?*
Shamsul Hoque (SH): The Padma Bridge will be a transformational infrastructure for the development of Bangladesh. It will connect the country's south-western region with the capital. The ferry system had been quite unreliable, time-consuming and not cost effective. Padma Bridge will alleviate these long-standing issues and give the new streamlined connectivity a lot of mobility. This will also decrease waiting and travel times as well as traffic jams. Operational costs for businesses will also decrease as a result. It will be a huge boost to our economy.

TDS: *For the first time, the southern part is going to be directly connected with the mainland, particularly the capital city of Dhaka. How do you look at this development?*
SH: Definitely, there will be new changes to networks and infrastructure. Given that our country is riverine, split by Padma and Jamuna, there has always been a divide between the north and south. Padma Bridge bridges this gap, not just for businessmen, but for general citizens and small businesses as well. This will also establish a connection on the Asian highway. Padma Bridge will give us the infrastructural support to capture income from overseas and change the quantum of our economics, provided we can figure out the missing links.

Dhaka being capital city has always had a gravitational pull from other parts of the country. And there have always been many bottlenecks in the process of coming to Dhaka. Now that process is going to become much easier thanks to the bridge. Internal and local traffic of Dhaka is however set to increase due to a lack of readiness in the city's infrastructure in tackling the new influx of people coming to Dhaka via Padma Bridge. Dhaka needs distributional infrastructure changes for all of its entry points otherwise, the value of time added by Padma Bridge may become negated by the increase in congestion. The expected returns to the economy from Padma Bridge and the Dhaka-Mawa expressway can be made effective if roads and passages into the city are improved.

TDS: *What is your take if you compare Padma Bridge with Bangabandhu Bridge regarding connectivity and economic potential?*
SH: When the rails were connected to Bangabandhu Bridge, trains would move only at 20 kilometres per hour and a lot of the compartments were sometimes empty. In order to avoid this, Padma Bridge was designed with a functioning railway in mind from the start. With Padma Bridge we had a hand in ensuring its quality. It was not just a show of our own financial competence, but also a showcase of our mental and visionary focus. A lot of local expertise was taken into consideration when constructing the bridge. But it was still a project undertaken by foreign companies. It has been a learning experience and something that we can boast about and with big construction projects such as this, we now have a clearer idea about the process of undertaking such initiatives. And so, with proper guidelines, we can construct even better and through our own resources.

TDS: *Roads of Khulna, Faridpur, Barishal remain two lanes but there is no doubt a vast number of vehicles are going to be plying them in the coming days, so what are the urgent concerns to mitigate this crisis?*
SH: Planning and vision are imperative for development in any country. Similar to how Dhaka's system will struggle to cope with the excess traffic that will happen as a result of the opening of Padma Bridge, when people living in the northern and southern parts of the country can travel to any of its twenty-one districts, they have to take roads that do not have the capacity. We have to create four lane roads in that case and take care of building road networks where there is missing and lack of development. Similar to how people will respond to the effectiveness of time utilised while coming to Dhaka, they will draw the same parallel when traveling outside of it via the Padma Bridge. The development will then not be considered as being integrated. There is a huge opportunity to initiate inclusive economic growth by developing these parts of the country and by building strong roads. The government has to take action in developing these parts, otherwise unguided development may take place. Our production is increasing and it is a matter of importance for our internal capacities to come on par as well, in time for our graduation from a least developed country.

Dhaka needs distributional infrastructure changes for all of its entry points otherwise, the value of time added by Padma Bridge may become negated by the increase in congestion.

TDS: *Which steps are necessary in order to keep Padma bridge safe in terms of maintenance, quick tolling system and fog in winter?*
SH: The good news is that the health-monitoring system for Padma Bridge is really smart. The internal sensors can provide feedback on where the bridge may be damaged or distressed, allowing for the government to exercise preventive maintenance measures. This ensures longevity. The bridge must have variable message sign-based traffic information systems so that diversion policies can be taken by authorities in case of bad weather. While the time required to travel across the bridge has been advertised as being very short, we have to take into account the long lines of traffic at toll booths. Travel time, environment and sound pollution may increase because of the congestion of a lot of vehicles. Electronic toll plazas and prepaid solutions have to be considered so that vehicles can come and go through, suggestions which are rudimentary for development. With RFID and electronic license plates ensured by the government, this could be a good platform to test out the technology.

TDS: *It is estimated that 8 per cent of vehicles will be added to the existing traffic in Dhaka once Padma Bride comes into operation. What would be the challenge to keep the capital city movable?*
SH: Dhaka has a supply constraint, that is, there are few roads but an overabundance of vehicles. The problem is an urban one and when new people come into the city, it adds a new dimension to the issue. This is an issue that policy makers need to address in conjunction with the creation of the bridge. Another key oversight is the creation of a single-track rail-line instead of a double track one. This is a fault in planning and was a responsibility of the Planning Ministry that needed to be communicated with the constructing agencies.

TDS: *Many housing estates are growing up in both adjacent areas of this bridge, which could create new problems on the linking roads. What should be focused on to avoid this problem?*
SH: The focus should be on developing both the landscape surrounding the bridge and the bridge itself. But if people have already bought the land surrounding Padma Bridge, then the value of the land will become heavily inflated as time goes on. Road development does not happen with just developing and protecting the roads themselves, but also by making sure that the area around it is also protected. The government has to hold control of the land and area around Padma Bridge as well as developing destinations. The key is to ensure guided development.

TDS: *What could be the future of our river transport system after Padma bridge?*
SH: If you look at the toll rates you can assume that it will not be affordable for a lot of people. Plus, the destinations that Padma Bridge covers are not the same as the multiple ferry boats can connect to. So those who cannot afford to use the bridge can always use the alternative river transport systems. For example, overloaded trucks do not have to pay a hefty toll to use ferries but would have to worry about high toll rates of the Padma Bridge.

TDS: *You are involved in the rail project of Padma Bridge. How can rail connection be effective in this project?*
SH: The railways are essential for allowing people to travel to places they would have otherwise not gone to. Another key importance is establishing freight connectivity. With a new port on the horizon, freight services will be hugely important for business and commerce. This will allow for train services to also be profitable, as around the world, it is through profits from freight services that allow subsidisation for the passengers on trains. This focus is however not there. The new rail corridor on Padma Bridge will definitely cater to the citizens and bolster tourism, but it is important that container and freight movement logistic chains are also taken into consideration. This will greatly benefit the country's institutions and it can generate business-friendly development.

Dr. Md. Shamsul Hoque is a Professor at the Department of Civil Engineering, BUET.

The interview was taken by Priyam Paul.

PADMA BRIDGE
PROJECT TIMELINE

1998-1999
Prefeasibility study (GoB funding)

2003-2005
Feasibility Study, finalised by JICA, Japan (JICA Grant)

2006
Land Acquisition Plan, Resettlement Action Plan and Environmental Management Plan (GoB fund)

2009-2011
Detailed design and procurement finalised by Maunsell Ltd. AECOM NZL (ADB TA Loan + GoB Fund)

June,2012
World Bank cancels loan

July, 2012
Bangladesh government decides to build the bridge with own fund.

June 17, 2014
Deal signed with China Major Bridge Engineering Co. Ltd. to build the main portion of the bridge.

November 26, 2014
Main construction of the bridge begins

December 12, 2015
Prime Minister Sheikh Hasina inaugurates the construction work of the Padma Bridge at Mawa in Munshiganj.

September30, 2017
The first span of the bridge is installed.

December 10, 2020
The Last span is installed

June 25, 2022
Inauguration of the Padma Bridge