'We have good standards, but we don't follow those'

In conversation with Prof. Dr. M. Shamim Z. Bosunia, Chairman and Managing Director, Abode of Consultants (Pvt) Ltd and Former President, Institution of Engineers, Bangladesh

How has the quality of construction evolved over the years?

The quality and standard of construction vary from area to area. Unfortunately, those who are involved with construction don't possess specialised knowledge and training regarding the quality of construction. I have been working with many construction projects since 1965. From my experience, I can say that good practice in construction was prevalent in the late '60s or early '70s, but the situation has changed lately. However, the quality of construction is better in Dhaka city compared to places outside the city.

The strength of the concrete usually varies from 3,000 PSI to 4,000 PSI for general construction. This is what we call compressive concrete strength. Compressive concrete strength is proportionally connected to the loads. If the strength decreases, the area increases. So, if we build a random structure without taking the strength into account, there will be no space for area expansion, which will inevitably pose a risk. In this regard, government and private institutions should introduce proper training and regular courses for engineers and for the workers as well. However, I must say that the construction quality has been improving over the years.

We saw the use of precast pile more than 10 years ago, which would be installed in the ground with a hammer. But this process vibrated the ground and left cracks sometimes. Therefore, we introduced the pile foundation that can be pushed easily into the ground. It also increases the quality of construction. This is a major change in construction technology as it can assess the bearing capacity of the pile. It is also available to 15-20 contractors of Dhaka city.

There is another method called rotary drill. When we use the percussion method, we extract the soil with the use of water. But rotary drill directly digs holes in large quarries.

Another technique that is new to the construction world is the diaphragm wall. Though some complications are associated with this type of wall, the wall still has some advantages. BRAC University is implementing this new technique in their construction process.

We are using pre-stressed concrete for the construction of bridges, factories, flyovers, overpasses, railway slippers, and MRT. The pre-stressed concrete is of high strength, which is nearly 6,000 PSI. I think we are heading in the right direction, but still, we need to make some improvements.

What are the construction standards in rural and urban areas of both big and small construction projects? Is there any authority that monitors the standards of construction? What are the standards of materials in saline-prone areas?

Bangladesh National Building Code (BNBC) was developed in 1993 and enacted in 2006. We prepared the second version of the code, which is yet to be implemented. However, BNBC didn't mention anything specifically about the rural and urban areas. The code particularly talks about wind and earthquake pressure. Additionally, the 1993 BNBC categorised three seismic zones, but the new draft code includes a new zone.

Regarding wind pressure, the code provides specific velocities for different areas. As for the coastal areas, 260 km/hour wind speed has to be taken into account, whereas 210 km/hour wind pressure has to be considered for Dhaka.

The most dangerous thing that I have come across is that we don't assess the capacity when we build multi-storey buildings. We opt for vertical expansions without assessing the impact. The lateral load is the wind load or earthquake load against a façade. The vertical load refers to the load that comprises the weight of the people, wall, etc. We only consider the vertical load and discard the lateral load. We should adhere to the standards.

Every upazila and municipal corporation appoints engineers to supervise the quality of construction, but ironically, they don't understand the quality. Even the inspectors of RAJUK don't check the strength of the structures. For this, we need strong leadership from the government.

We have taken some initiatives for saline-prone areas. In 1991, a deadly cyclone took place in Chattogram, which resulted in the deaths of many people. The then government formed a committee with the assistance of UNDP to conduct a study in the coastal belt. I served as an engineer for the project. We found that almost seven to eight shelters, which were built between 1972 and 1978, crumbled due to river erosion. Most of the shelters were in a precarious condition due to lack of maintenance.

Besides, the wrong materials and wrong specifications were used for the construction work. The main reason for bad construction was the use of brick aggregates. It is advisable to not use brick aggregates in concrete, especially in the coastal belt. If brick concrete is used, it can absorb saline water. Saline water is injurious to the formation of crystals of sodium chloride and the exerted pressure leaves cracks on the concrete. We should use stones instead. Additionally, the concrete must be of higher strength, most preferably 4,000 PSI.

What are the challenges in ensuring safe construction practices? How can they be overcome? Sometimes, even when standard materials are used, they are not utilised in the right manner. How can this problem be solved?

Some developers in Dhaka comply with the safety rules in their construction projects but most others don't. Our construction workers don't bother using boots, ropes, or helmets when they work. Safety rules need to be strengthened. Contractors and owners should be penalised if they don't adhere to the safety mechanisms. Moreover, we can't expect good results if we don't improve technical knowhow besides the quality of the concrete and materials. Also, the attitude and knowledge of the workers should be improved.

Concrete should be compacted to increase strength and durability. Theoretically, 5 percent less compaction can reduce the strength by up to 20-25 percent – making the strength around 75-80 percent; 10 percent less compaction lowers the strength to 50-60 percent. We should also assess the measurement of the casing pipes while installing the pile foundation. The casting/welding of the pile cap level and mat should be done separately. Private institutions should initiate training regarding such issues.

What precautions should be taken regarding the standards of materials for ongoing and future construction projects? What can we do to ensure that we meet international standards?

Concrete has a direct connection with water. The strength of the concrete will be reduced with increased use of water. We often see that construction workers add more water to the concrete, which adversely affects the concrete strength.

Previously, coarse and fine aggregates used to be properly washed in the reservoir to remove contamination from sand, particularly the coating of animal faeces which ensured the presence of ammonia. This process increased the strength without there being any monetary investment. For example, if the strength was 3,000 PSI before washing, it stood at 4,000 PSI after washing the aggregates. Now, only one company applies this process to strengthen the aggregates, but the others don't follow such simple and cost-effective techniques.

Though our standards and designs comply with international standards, we lack sufficient data to formulate the BNBC. We imitated the existing building codes, such as the American Standard Building Code, and incorporated what we needed for our construction projects. BNBC needs to be properly implemented all over the country. We have good standards, but we don't follow them.

How can we ensure the longevity of the existing structures? How can we prevent accidents and be better prepared to tackle calamities such as earthquakes?

If we want to ensure longevity, we must ensure that concretes are of good quality and designed properly so that they can prevent corrosion and restrict water. We need competent designers and registered persons to do the job. There's a building in Gulshan which sways in the wind. This is undoubtedly the wrong design. Besides, the designs of the buildings should be checked by a third party. The government should form some units that have authorisation such as ISO and they should check the design. To build an earthquake-resilient building, we should focus on the detailing of the structure. There's no extra reinforcement required for earthquake-resilient buildings. All we require are some practices, recommendations, and material modifications. For example, we don't need many rods for constructing earthquake-resilient buildings; rather our focus should be on detailing. Overall, we need to take up protection mechanisms in case of earthquakes, which exist in design, but not in practice.

The interview was taken by Maisha Zaman and Labiba Faiaz Bari.