

# Evaluation of Building Construction Management in Sylhet City, Bangladesh

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**Abstract:** Construction management is essential for achieving any pre-determined objective. It is however seen that in spite of construction management, majority of the project do not keep up their original time schedule and their completion cost is also higher as compared with the estimated cost. The main reason for overrun in time and cost is that the planning at the outset of the project was not adequate or method of planning was not a refined one. In this research work, I showed the overall conditions of construction work and management in Sylhet city of Bangladesh and found many drawbacks in the construction management after completing my research. I found several factors affecting proper construction management and I have provided brief results. I have also provided some recommendations after my research work.

**Keywords:** Field survey, management system, drawbacks, recommendation

## I. INTRODUCTION

Construction Management is a professional management practice consisting of an array of services applied to construction projects and programs through the planning, design, construction and post construction phases for the purpose of achieving project objectives including the management of quality, cost, time and scope. Construction Management is a discipline and management system specifically created to promote the successful execution of capital projects for owners. These projects can be highly complex. Few owners maintain the staff resources necessary to pay close, continuing attention to every detail--yet these details can "make or break" a project. A professional Agency of Construction Management (CM) can augment the owner's staff with pre-planning, design, construction, engineering and management expertise that can assure the best possible project outcome no matter what type of project delivery method used.

## II. OBJECTIVES

- To study the existing condition of building construction management system in the Sylhet city.
- To mention drawbacks of the existing building construction system.
- To recommend proper building construction management system.

## III. DATA COLLECTED FROM PROPOSED BUILDING PROJECTS

For my research work I have collected data from the ten high rises building from Sylhet city. The data that I have collected from my field visit have been presented below. The locations of my proposed building projects have been made in random selection to cover almost all urban area of Sylhet city. Here I have presented my project names that I have visited in my research work.

TABLE I  
PROPOSED BUILDING PROJECTS WITH THEIR LOCATION IN SYLHET CITY

Serial No.	Project Name	Project Area (Square feet)	Type of foundation	Number of story
1	3 <sup>rd</sup> Men's Hall (D-Block)	3410	Pile	4
2	A-Building (1 <sup>st</sup> -Block)	12897	Pile	4
3	Pump Tower	10000	Raft	14
4	Central Muslim Sahitya Sangsad	6000	Column Footing	5
5	Mustoba Tower	2300	Raft	8
6	Ridge Tower	8500	Raft	24
7	Gulzar Tower	10700	Pile	10
8	La-Rose-Centre	5500	Raft	14
9	Ark Homes	7000	Pile	10
10	Karim Tower	4050	Pile	10

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TABLE II  
MIXING RATIO OF CONCRETE OF OUR PROPOSED BUILDING PROJECTS

Serial No.	Project Name	Mixing Ratio		
		Sub-structure (foundation)	Super-structure	
			Column	Beam-Slab
1	3rd Men's Hall (D-Block)	1:4:6	1:2:4	1:4:6
2	A-Building (1st-Block)	1:4:6	1:2:4	1:4:6
3	Pump Tower	1:1.5:3	1:1.5:3	1:1.5:3
4	Central Muslim Sahitya Sangsad	1:1.5:3	1:1.5:3	1:2:4
5	Mustoba Tower	1:1.5:3	1:1.5:3	1:1.5:3
6	Ridge Tower	1:1.5:3	1:1.5:3	1:2:4
7	Gulzar Tower	1:2:4	1:1.5:3	1:1.5:3
8	La-Rose-Centre	1:1.5:3	1:1.5:3	1:2:4
9	Ark Homes	1:2:4	1:1.5:3	1:2:4
10	Karim Tower	1:2:4	1:1.5:3	1:2:4

IV. DATA ANALYSIS

In my proposed building projects normally 40, 60 or 75 grade mild steel deform bars of various brands are being used. Among these brands of steel BSRM brand steel is used in most of the projects as shown in the following pie diagram.

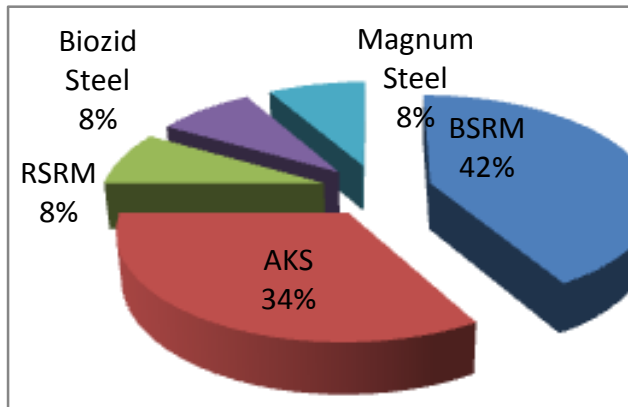


FIGURE I  
TYPE OF STEEL USED IN PROPOSED BUILDING PROJECT

For important structures the fineness modulus (FM) of fine aggregates should be minimum 2.5. The local sand of Sylhet normally satisfies the FM value and it is available also. For this reason all of our proposed building projects used the Sylhet sand as fine aggregate

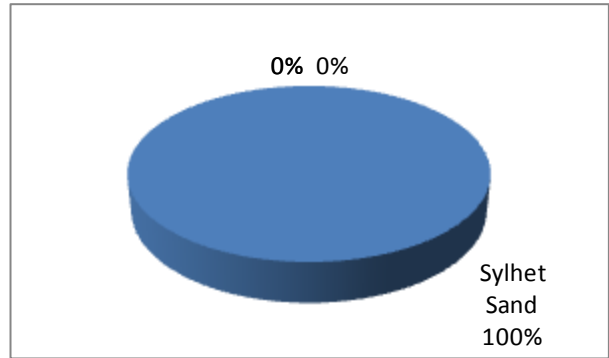


FIGURE II  
TYPE OF FINE AGGREGATE USED IN PROPOSED BUILDING PROJECT.

Normally brick chips and stone chips are used as coarse aggregate in concrete for building construction. But for high rise important building construction the required strength of concrete does not meet using brick chips. Moreover, the stone chips are available in Sylhet. The uses of stone chips are shown in following pie diagram:

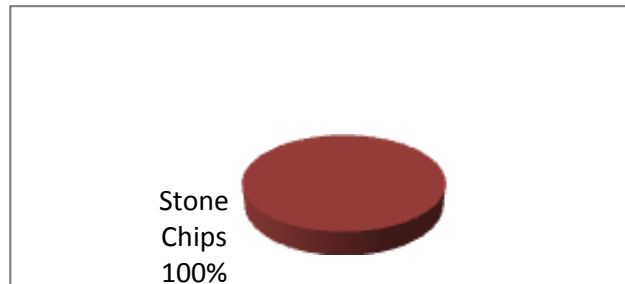


FIGURE III  
TYPE OF COARSE AGGREGATE USED IN PROPOSED BUILDING PROJECT.

Most of my proposed building projects used Ultimate Strength Design (USD) method for structural design than Working Stress Design (WSD) method as shown in the following figure. This is becoming possible for the present competitive marketing system as they ensure the material properties as refer.

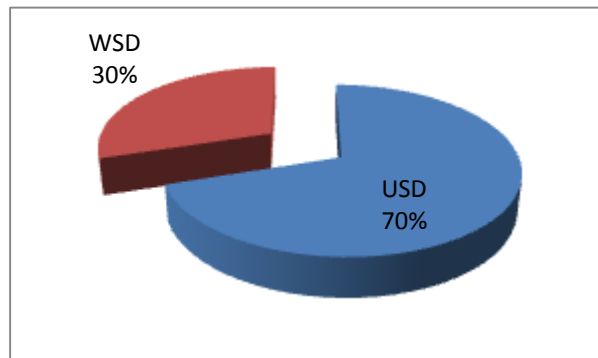


FIGURE IV  
STRUCTURAL DESIGN METHOD USED IN PROPOSED BUILDING PROJECT.

The pie diagram presented below gives an idea about structural design method used in previous study. Where we can see that the Working Stress Design (WSD) method was used widely than Ultimate Strength Design (USD) method.

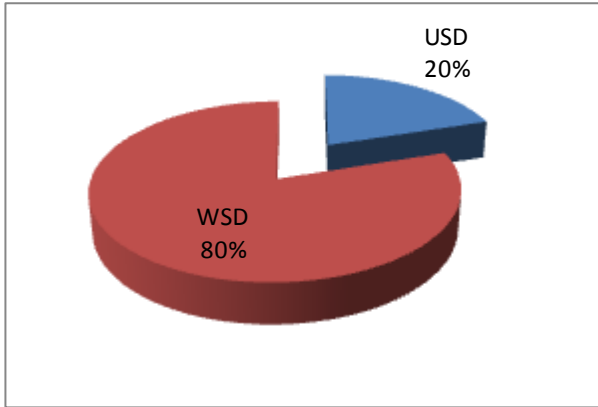


FIGURE V  
STRUCTURAL METHOD USED IN PREVIOUS STUDY.

Here the following data analysis represent that the most of the workers have no considerable educational qualification. Among them 40% workers are under class 5.

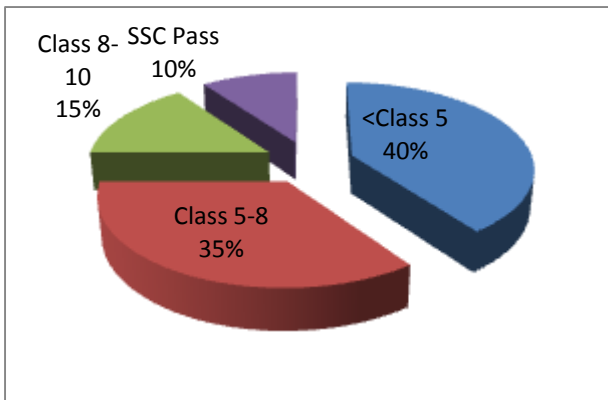


FIGURE VI  
WORKER ACADEMIC QUALIFICATION.

In my proposed building projects steel shutters have mostly used. Steel shutter does not absorb water from concrete and therefore not harmful. It can be used repeatedly and it has good salvage value. Hence it is chosen by most of the projects

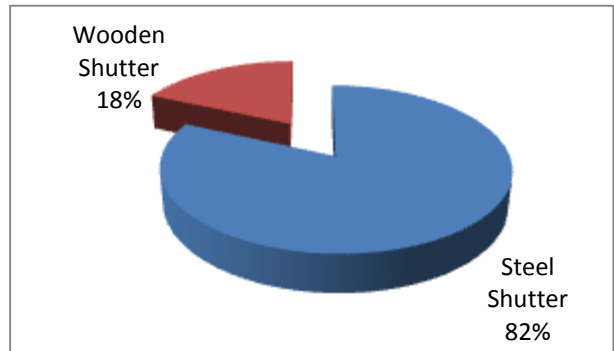


FIGURE VII  
SHUTTER USED IN CASTING VARIOUS ELEMENT OF BUILDING PROJECTS.

Figure illustrated below by pie chart refers that the workers employed in our proposed building construction projects are not conscious about their safety. Most of the projects employers were not provided with proper safety measures.

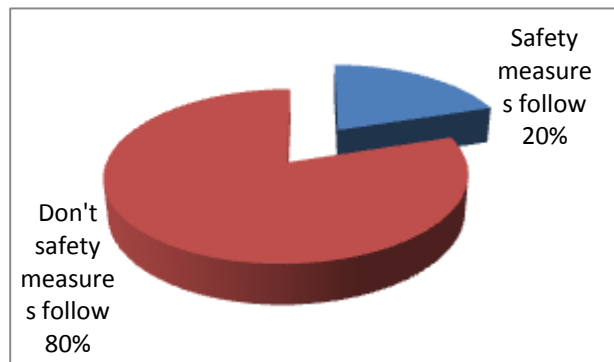


FIGURE VIII  
CONCERN ABOUT SAFETY MEASURES OF WORKERS.

Most of our proposed building construction projects follow their project time schedule, except some government projects as shown in the following pie chart. But to determine project time schedule most projects do not follow networking method

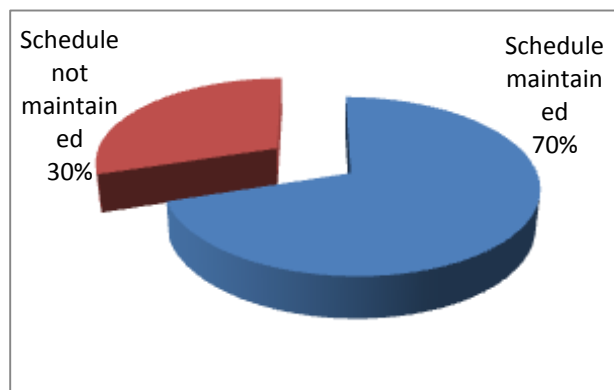


FIGURE IX  
PROJECT SCHEDULE MANAGEMENT

The following pie chart represents the educational qualification of project engineers. Where we can see that 60% projects are supervised by diploma engineers and other 40% projects are supervised by B.Sc engineers.

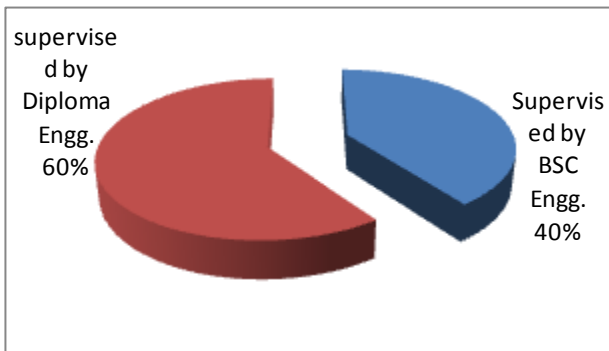


FIGURE X:  
EDUCATIONAL QUALIFICATION OF ENGINEERS.

From the following pie chart we can see that 30% project engineer are fresh in experiences, 30% project engineers have 1 year experiences. This indicates that 60% project engineers handling the projects with least experiences.

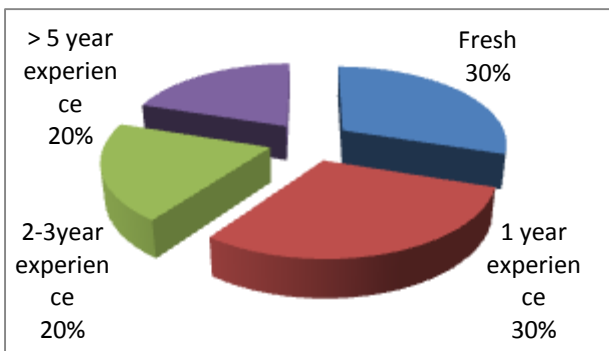


FIGURE XI  
EXPERIENCES OF PROJECT ENGINEERS.

The following pie chart represents that there is no professional training of foremen and workers. That means 100% workers work without any professional training. They work from their experiences only.

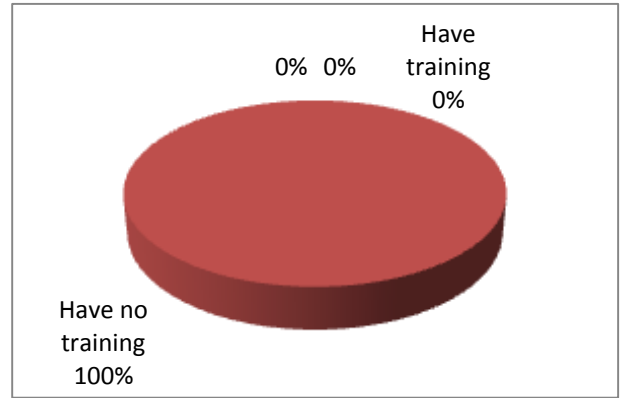


FIGURE XII  
PROFESSIONAL TRAINING EXPERIENCES OF FOREMAN AND WORKERS

Some drawbacks of the management in proposed building projects:



FIGURE XIII  
MISMANAGEMENT OF CONSTRUCTION MATERIALS AT PUMP TOWER.



FIGURE XIV  
THE COARSE AGGREGATES BLOCKING THE ROAD AT DARSON DEURI





FIGURE XV  
THE COARSE AGGREGATES ARE GETTING MIXED WITH FOREIGN MATERIALS AT MUSLIM SAHIYA SANGSAD PROJECT.



FIGURE XIX  
WORKER WITHOUT ANY SAFETY MEASURES AT ARK HOMES IN HAWAPARA.



FIGURE XVI  
WRONG MANAGEMENT OF STEEL AT MUSLIM SAHIYA SANGSAD PROJECT.



FIGURE XX  
SIDE WALL HAS BROKEN ON THE FOUNDATION AT MUSTOBA TOWER.



FIGURE XVII  
UNCONSCIOUSNESS OF WORKERS ABOUT SAFETY AT RIDGE TOWER IN DARGAH GATE.



FIGURE XXI  
RISKY WAY FOR WALKING AT KARIM TOWER.'



FIGURE XVIII  
UNCONSCIOUSNESS OF WORKERS ABOUT SAFETY AT KARIM TOWER.



FIGURE XXII  
BURDEN ON SLAB CASE BEFORE CASTING AT ARK HOMES.





FIGURE XXIII  
TO KEEP ELECTRIC WIRE AT CASTING PLACE AT KARIM TOWER.



FIGURE XXIV  
FOUNDATION HAS FLOODED AT MUSTOBA TOWER IN ZINDABAZAR



FIGURE XXV  
3- SUB BASEMENT BELOW GROUND LEVEL WHICH IS VULNERABLE FOR EQ AT PUMP TOWER

## V. RESULT & DISCUSSION

From my proposed building projects supervision, it is clear that, the projects are not being managed properly. Every project has some limitations in their management system. The result of building construction management at various sectors discussed below:

### A. Project Planning Management

Every project has a plan, through which the project schedule and cost are maintained. Most of these projects are following project schedule and thus will be able to complete the project within project duration. But to calculate project time duration no network system method

is used. By using Critical Path Method (CPM) and Program Evaluation Review Technique (PERT), it is possible to reduce project time duration. This will reduce labor cost, instrument cost, and thus reduce overall project implementation cost. For managing cost the Internal Rate of Return (IRR) method and cost benefit analysis are not used.

### B. Construction Materials Management

The construction material management system in most of the projects was very poor. At Pump tower, the aggregates were stacked beside the road with the excavated soil shown in Fig XIV. Thus the aggregates are getting polluted. At Muslim Sahitya Sangsad, the aggregates were mixing with foreign particles and the steels are stored outside below the open sky and getting corroded shown in Fig XVI. The materials are wasting at every site.

Such mismanagements of construction materials are responsible for avoidable cost during construction. Careful monitoring and strict supervision can reduce these avoidable costs, which results reducing the overall project cost.

### C. Quality Control

The quality of the construction materials is ensured by the laboratory tests and maintaining testing references in most of the projects. But the field tests of the materials also have to be maintained by the field engineers. The quality of work also depends on material management. Therefore the purity of materials has to ensure in field to control the quality of the work. The concrete mixing ratio has to maintain to achieve required strength. But most cases this mixing ratio is not maintained. For this purpose a Ferra of certain volume have to provide and in this case the volume of 1 bag cement (1.25 cft) can be considered.

### D. Worker or Labor management

Worker management is so important to implement project within project schedule. Most of the projects I have visited were under different developers. They utilized their labors for certain project. 3rd student hall and A-building (1st) were under same developer and labors were utilized in these two projects based on demand.

Maximum utilizations of labors will result implementation of project within or before project schedule and cause reduction in overall project cost. This will be possible by-

- ✓ Paying salary in due time
- ✓ Paying bonus and incentives
- ✓ Motivating

In our proposed building projects the labor payment system was-

- ✓ Daily payment: For food purpose
- ✓ Monthly payment: Salary

### E. Worker Safety Management

Worker safety is very important in building construction as various potential hazards such as –falls from height, trench collapse, scaffold collapse, electric shock and arc flash etc. often occur at the construction site. From my project supervision we have seen that about 80 percent worker were unconscious about safety measure.

### F. Equipment and Tools Management

Equipment and tools used in any construction site play vital role in the smooth and effective completion of the work within the work schedule. If the equipment and tools of construction project is properly handled or utilized, they could give maximum work output within least possible time than the work performed by the manual way. But in my proposed building project, they did not used sufficient equipment and tools. They used only certain type of equipment which was most needed. If they had used sufficient equipment and tools, it could have reduced the numbers of worker. Hence labor cost could be minimized.

### G. Limitations for Earth Quake (EQ)

- Underground spaces are provided in most of the proposed building projects. The Pump Tower at Darson Deuri is included with three underground basements. Which are considered as soft story and so vulnerable during EQ.
- Minimum spaces between buildings are not maintained which will cause pounding effect during EQ.

### H. Comparison between the structural systems of my proposed building projects with secondary data obtained from previous research work

- In my proposed building construction projects 70% are designed by Ultimate Strength Design (USD) but in previous research work only 20% projects were designed by USD method.
- 30% of my proposed building projects are designed by Working Stress Design (WSD) method, where in previous research work 80% projects were designed by Design (WSD) method.
- As the USD design method used maximum material properties therefore this method is cost effective as less material are required in this method than WSD method.

In my project supervision we have seen that 30% project engineers are fresh, 30% project engineers have 1 year experience ,which indicates that 60% project

engineers has very poor experiences. In this case the project engineers have to face various problems.

In most of the projects the Foreman's has no professional training. They work from their experiences. For workers who work under Forman, the scenario is same. As a result the project often has to face avoidable problem.

If the professional training can be ensured to the Foremen and workers, the building construction management will become easy. Hence the avoidable technical problems in the project will minimum and the effective & economic project management will ensure.

## VI. CONCLUSION & RECOMMENDATION

### A. Conclusion

At present time, numbers of high rise building are being constructed in Sylhet city. From our study of building construction management system, we can conclude that construction management system is not being properly performed, although some positive changes in the building construction system can be seen with the passes of time. For example, USD system is used widely in structural design now- a- days instead of WSD method. But the management systems have some limitations in the sector of materials management, labor management, workers safety management and tools & equipments management. If the limitations in these sectors can be eliminated then construction management will be perfect.

### B. Recommendations

- For project schedule management, we can use Critical Path Method (CPM) and Program Evaluation & Review Techniques (PERT).
- Internal Rate of Return (IRR) and Cost Benefit Analysis can be used for cost management.
- Materials should be stored in proper way and should be ensured it's availability during work.
- Materials wastes should be minimized as far as possible.
- All laboratory tests of materials should be performed and field test of materials should be done by field engineer.
- Workers should be well trained and handled according to the work.
- Workers should be provided with the required safety measures. Such as-Helmets, Gloves, Work shoes or Boots etc.
- Sufficient equipments and tools should be ensured to reduce work time and project costs.

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