# School Construction in the Private Sector

## A project for a private sector, design and construction also at private level

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## Summary

Bangladesh is a developing country, where the new constructions are growing everyday and changing the skyline very fast. Among those we will discuss about a project in brief which comes totally from a private sector. In the Capital City Dhaka, a lot of large-scale projects are rising from private investment. Of course it is a good sign of emerging economy, but are these projects are growing in a methodical approach of construction? Or do we have enough measures to run a construction economically?

I think, no, it is not. That is why a mismanagement and haphazard situation consists in our construction field creating poor urbanisation.

After joining in ICM course, I found a lot of lacking in various stages of our project. This paper is to analyse those points at the end of this paper. But it starts with the information about our country, its urbanisation, then about the project planning and design, procurement of consultant and contractor. Later I am discussing about the construction process, its production planning and quality management. But the most important lacking I found is in the property management, where it is totally absent in our construction field. So it is very important to know, what we do not know about a construction of a project from this course. It is an attempt to find out those lacking by this paper.

## Introduction

Construction is booming in Capital City Dhaka of Bangladesh, right now. Previously, most of the large-scale projects were done under the Government jurisdiction. But now, a lot of projects are coming up from private sectors.

The “Scholastica School”, a school of English medium is owned by a private company, project consultant is another private company and of course the construction by another private company.

This school has several branches, among them this project is their head complex. In January 1997,we started the design process and since September-1998 the construction is going on. I am involved with this project since 1997 as one of the two architects’ on behalf of consultant.

### Aim of the paper

- The aim of this paper is to give an impact and understanding about a large scale project which is solely running at a private level,
- About the process in design and construction level,
- The impact and its beneficiaries from the project in the society,

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- Also the context of the project, the city, the country, its specific geographical, economic, cultural and political strategy.
- To compare the way the project run with experiences from the ICM course. It is an attempt to find out some issues and guidelines for more methodical way of construction of such a project.

## Facts about the actors in the project

The project combination of four groups - all of them from private sectors as follows

### The Client

This project is the head complex of an English medium school upto "A level", named as "Scholastica School Pvt. Ltd. Headed by a lady as chairperson. There are about 120 nos. of teachers, 30 nos. of other staff related with the school. Among them 95% are women. There are six classes from 6th to 12th classes, and each contains six of its sections. About 36 students per section and the percentage of boys and girls are 40% and 60% respectively.

This school has two other branches in Dhanmondi and Gulshan area of centre of the capital. Our project is their head complex. The running cost of the school is obtained from the student's tuition fees.

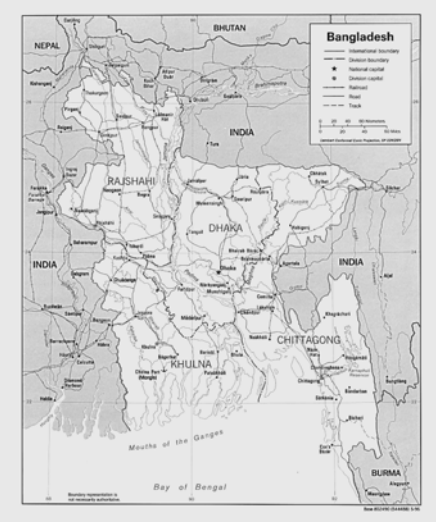
### The Consultant

The consultant for design and supervision of this project is 'Design Workshop'. It is a private architectural consulting firm, headed by an experienced architect. Another architect of this company is me. Others are two Civil engineers, one Electrical Engineer, one mechanical Engineer, six Cad operators, one Estimator, two Management staff, three Diploma Engineering in Civil at Site and with a lot of modern office equipment's.

This company is involved with designing of so many Educational, Training Projects, Residential buildings and Interior designs. The main tasks of this Company for this project are:

- All sorts of Designing, Civil, Electrical, Mechanical etc, Survey, Cost Estimating, Analysis, etc at Design stage.
- Tender preparation and documentation and Tender calling and Bidding at Tender stage.
- Supervision, Bill preparation and Schedule maintaining at Construction Stage.

1. **The Financier:** Because the school is running by its earning only, so they have not so much funds for this project. The project cost is estimated as $30,000, SEK 255 Million. About 40% of the cost is provided by school itself, rest is as loan from banks. Two foreign banks are giving this opportunity to them. Land is given by RAJUK[2] at nominal fees, as the site was a part of their masterplan for any kind of school.
2. **The contractor:** The contractor of this project is "Technocon Ltd." Which is involved in construction since the beginning of 80s, headed by a Civil Engineer as Managing Director. There are four Directors, three Civil Engineers as project co ordinator, several Civil, Electrical and Mechanical Engineers, two Managers at site, other four Diploma in Civil and Electrical are as Site engineer, two Estimator, three groups of Workers for Civil work 40-50, for Electrical work 10 and for plumbing work another 10, other staff are more or less 5, and also well equipped by all other equipment for construction.




### Geographical, national economic, cultural and political condition of Bangladesh

Bangladesh is at the NorthEastern part of South Asia, latitude 20.01 to 26.38 North and longitude 88.01 to 92.41 East. India on the West and NorthEast, and on South East again India and partially by Myanmer. The largest coastal area on South.

It is an independent country since 16th December 1971, most of the inhabitants are Muslim. The earliest immigrants were Austrloid, later Dravidians from Western India and Aryans from central Asia. Later the Turks, Arabs, Persians and Afghans came to this land. Europians were the first for the trading and also the Dutch, French, Portuguese and Armenians for the same. So there is a mixed cultural development flourish among the inhabitants with several religion- Muslim, Hindus, Buddhist and Christians. Total area of the country is 147,570 sq.km. Where 18,559sq.km. As forest and 1992

2 Rajdhani Unnayan Kartipakhha: The authority for improvement of capital city.

sq.km. as waterbed. The landscape almost flat and fertile and only 20% with contour area. Average temperature is 24-38 degree celcias.

The capital city is Dhaka and excluding this, there are five other Divisions, 65 districts and 68,000 villages in between them. The largest port is Chitagong port.

The present population is 125 million. Until 1951, it was almost a rural agrarian country with 95% of population in rural areas and only 5% in urban areas. But with the degradation of economy, lack of opportunity in rural areas and for a better living standard, a massive migration from rural to urban took place. This obviously has a strong impact on growth of Urbanisation. Shown as the Statistics,

**Population growth**

| Year | Population in Million | Growth |
|---|---|---|
| 1951 | 44.17 | .5% |
| 1974 | 76.39 | 2.48% |
| 1991 | 111.45 | 2.17% |

**Urbanisation growth**

| Year | Population in Million | Growth |
|---|---|---|
| 1951 | 1.83 | 4.34% |
| 1974 | 6.00 | 8.87% |
| 1991 | 22.45 | 20.155 |

This over whelming statistics clearly emphasis the need for more constructions each year.

Density of population is at nearly 1956/ sq.mile, but in Capital City it is almost 10000/ sq. mile. Dhaka has the population of 9 million in 1528 sq.km area.

35% of the gross domestic products say rice, wheat jute, etc from agri sector; other mineral resources are natural gas, oil and hydro electricity.

Because of the high population and unemployment, labour rate is very cheap in our country. That's why a lot of labour force involves with construction and exporting garments sectors.

From climatic point of view, it is a country of natural calamities such as flood, which hampers agri economy.

We have a Parliamentary Government but political unrest often hampers the development and economy as well as the construction.

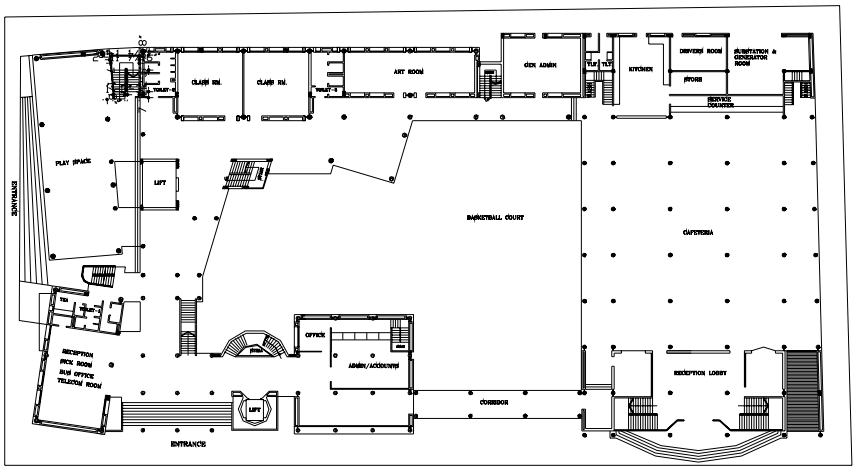
So nobody can ensure his progress or the cost for the project as its expectation.

# The Project

Site of the project is at Uttara, a model town urban project by RAJUK for housing plots for government Officials and middle class people in capital Dhaka.The size of the plot for school is about 3 acres or 4280 sqm. It is six storied building with Three 16-passanger elevators. Covered area for plinth level is about 2620 sqm. Excluding a courtyard within the building as breathing place. This building contains three-separate blocks joined eachother by expansion joints.

They are **Block-A** (Six storied) as Admin Block of 515sqm area, **Block- B** (Six storied) **a**s ClassRooms of 988sqm, **Block-C** (Two storied) as Multipurpose Area of 1117 sqm. Admin Block contains the Teachers area, Admin office, Labs and Library at upper level. Class Room block is with 48 classrooms, computer labs, art room, music room etc. The Multipurpose area contains an open cafe with kitchen and dining area at lower level and a multipurpose hall at upper level.

The building is elongated to North- South and the entries are one from south other two from East – one in Admin block another at multipurpose hall.




GROUND FLOOR PLAN

*Master Plan*

# Design Stage

### Project organisation

"Design Workshop" an architectural consultency firm was directly appointed by the client to prepare architectural, structural, electrical, plumbing and all other drawings for construction and also to prepare tender documents, cost estimating, bidding etc for Tender Bidding phase and supervision during construction.

An architect heads the consulting firm, under him another associate architect and several engineers worked. Under this group, the Cad operators, estimators and site engineers.

Associate architect was responsible for all architectural drawings, working drawings, co-ordination between structural, electrical, mechanical designers, and supervision during construction etc.

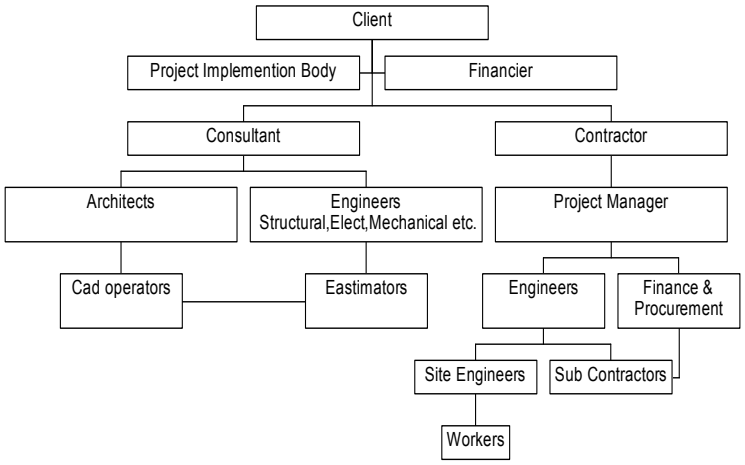
Senior architect (The Proprietor) was responsible for co-ordination between the client and the contractor about the instructions, demands, specification of material, supervision and management of design, etc. All other engineers are related to their respective jobs as preparation of structural, electrical, sanitary drawings, supervision etc.

There is a project implementation body with a civil engineer and other five administrative personal, works behalf of the client. They look after the progress of the construction, performance of consultant and contractor during construction and keep them touch always with the consultant and the contractor.

The contractor does the execution through appointing their subcontractors, workers and site engineers. There is a project manager from contractor who supervises overall management, purchasing control, payments of subcontractor etc. Another site manager at site who guides the other engineers and workers during construction.

### Procurement-contracting

The appointment of contractor was arranged through a competitive bidding among the short listed companies with some terms and condition- not only considering the lowest but the organisation itself. As per tender clause the contractor purchases the equipments for execution all the materials. But of course purchase of materials are mostly as per instruction and specification in tender document. The materials are mostly as per instruction and specification in tender document are specified by the consultant. A meeting between the client and the consultant does any kind of alteration of material, the contractor can propose about it only.




## Project planning

Initially the client did the idea for this project himself, because their other branches of school are in rented buildings, which were used as residence previously. These do not serve the function of the school properly, that's why client needs their own building with all of the facilities of a school. At this stage the client only fixed up their basic requirements for school building. Later client appointed an architectural firm, where the consulting firm prepares the preliminary design, the cost estimate and feasibility study. There was a lot of discussion, meetings between the client and the consultant to fix the requirements, budget, construction materials etc. After the approval of preliminary design, the final drawings and cost estimation was done. Then the drawings submitted to city development authority RAJUK for approval. By this time the client formed a body behalf of him for project implementation. Next the contractor was selected through tender from a group of shortlist companies. Detail drawings are prepared by the consultant simalteniously with the starting of construction at primary level. A time schedule or gang chart was prepared showing the starting of construction at September '98, and ending at September 2000.

## Project financing

Finance is provided partially from school fund and mostly from three foreign banks as loan. More or less 40% of the total cost financed by client and rest from banks. This school is the pioneer among the English medium schools in Dhaka and their yearly turnover is quite good, that's why the banks were very much interested to invest.

## Budget and budget control

For consultency, the fees were $ 60000, which is less then the normally practised 3% of the total cost and for supervision $1000 per month. For construction, it was estimated as $ 3.27 millions according to PWD [3] schedule. But it becomes lower to $ 3 millions after some changes in design and use of materials and also by competitive bidding among contractors. It becomes more economic in comparison to other construction, because

- It was estimated several times before investment.
- Continuous observation, check and balance of the construction cost with estimated cost.
- Alternative solution and evaluation of design, materials and workmanship with the cost consequences.

Any changes in budget items jointly done by the client and consultant. Budget is controlled to complete the construction as estimated and of course by keeping the quality and workmanship as specified earlier.

[3] Public Works Department: Government organisation for construction.

*Computer Image of the School*

**Information Technology**
Earlier it was mentioned that the consultant is well equipped by modern Technology, so that most of the works in design level are by use of computers. First the preliminary work of design, done by manual sketches and drawings by the architects, later the detail architectural, electrical, plumbing drawings by Auto Cad[4]. But the structural analysis by Stad[5]. Preparation of tender documents by using Word, Excel etc. The most Advantage of information Technology we used is the 3-D view of computer rendering several times. So that we could change the design, the materials, the colours etc after analysis of these three dimensional views. The final view is used for this paper.

**Conclusion**
This project is designed by modern technological support and it is easier to cut down the cost at early stages. Budget is well controlled for close observation of the consultant and client. Flexibility of changing materials and design time to time makes the design more perfect.

## Production stage

**Tendering and contract**
After the approval of client for preliminary design and cost estimation, an advertisement was published in national dailies for prequalification. For prequalification two basic points were considered, one the organisation itself and experience in construction and other is the biggest work not less then $ 38 million. Among the contractor, nine was shortlist. By this time detail tender schedule was prepared and the competition invited among the short listed contractors. Finally four companies submitted their proposal and The Technocon ltd. became the lowest and selected. Evaluation had done by the consultant with the concern of the client and their project implementing body.

The most important points for bidding documents are

- Document contains the bill of quantity, types of works, unit price.
- Quoted rate is above or less than given cost.
- Time schedule mentioning staring and completion of project.
- Specification about material and workmanship.
- Mode of bill payment.
- Condition of acceptance.
- Condition of payment for non-tender items.
- Description about the different taxes and its amount is to be paid by the contractors.
- Warranty and security.

Later the agreement was signed between the client and the contractor in presence of the consultant, where the followings are the part of agreement,

- The letter of Acceptance.
- The Work Order.

[4] Software for architectural drawings.
[5] Software for structural load calculation.

- Notice inviting bid.
- The contract data.
- The instruction to bidder.
- The Condition of Contract.
- The special Condition of contract.
- The technical specifications.
- The Drawings.
- The Schedule of Items.

**Prequalification →Evaluation and shortlisting → Prep. Of Tender → →Invitation bid → Evaluation and selection → Awarding contract.**

*The School- Under Construction*

## Production planning

After completion of detail design and selection of contractor, production planning was done with the concern of each actor.

The Client was responsible for financial support for the whole period of construction. The client kept themselves touch with the consultant and the contractor by their project implementing body. Their Implementing body was responsible to report time to time about the progress and quality of work; there is a meeting in each month at client's office between them and consultant about the progress, changes, and demands by the clients, for the project.

The Consultant was responsible for preparing the progress report in each month, doing all the supervisions, top supervision, supply of necessary detail drawings time to time to the client and the contractor. He also responsible for clarification of any drawings, written instruction for any changes, recommendation for testing of different materials, taking of measurements or measure the quantity of works, checking of bills of contractor and instruction for payments. To keep the work in estimated time frame by comparison the progress, he was responsible to make the contractor more concern. They also asked to prepare a revised time schedule for completion mentioning starting and finishing of work after analysing details of design and to supply it to the client, and to the site office.

The Contractor was asked to go throw the drawings, clarify any confusion from consultant, and take necessary steps about materials, equipment, and labour force for the work in different stages. The contractor also responsible for procurement of required materials, equipment's in each stage of the work as specified before and preparation of bills after completion of a major work, with the concern of the consultant.

They also responsible behalf of all subcontractors and workers for any damage etc, also for the monthly meeting at site between the all actors for discussion about the work in details, supply the letter of agreement for any changes time to time.

## Quality management

Quality of management was ensured in different stages of construction:

- In design stage: During design, it was always considered by well solve and detail design, to fulfil the functional requirements for easy and better workmanship. Selection of material was planned during design process according to the quality, aesthetic and way of workmanship.
- In contracting stage: Earlier said that contracting was done by competition among the reputed companies, not only considering the lowest bid also the organisation, reputation and financial condition etc. Specification of materials is given from the best quality materials and workmanship. These are the materials, which are used before in different quality construction work, and having good testing result, low mentainence and good aesthetics. The contractor selects the subcontractors and labours on the basis of their reputation, labour force and skill.

- In construction stage: During the construction every fourth week of the month, a meeting among the client, the consultant and the contractor was held at the site and every second week of month at client's office between the client and the consultant. Before supply of materials at the site, the contractor was responsible to provide samples of materials to consultant for approval. Again after supplying of materials at site, it is checked as per specification by the engineers of the consultants and also by the representative of the client and give approvals. Random samples of different materials are sent to the laboratory of Bangladesh University of Engineering and Technology for test regularly. Any items failed to attain its specified quality are removed from the work. The workmanship is also checked by the consultant's engineers, architects by regular supervision and by top supervision. Samples of works were done before the whole and checked by the architects.

**Economic control- budget review and reconciliation**

It is mentioned that to make the construction economic and well functioned – effort was given in design stage, contracting stage and construction stage. According to detail estimate, the financial support was allocated in different stages of work. It is always checked and verified and compared with the actual work in site and the estimated cost. Budget is fixed as per offer of tender, so that the comparison helps to know about the availability of finance in different time. The contractor checks items with current market value and for any major fluctuation of cost, the material can be change with the concern of consultant and client by a meeting. The payments of the contractor usually done after submission of bills by contractor, which were checked by the consultant, as per quantity of work at site, scrutinised them according to drawing and rates submitted by the contractor earlier. After the major payments to contractor, then budget was reviewed in each meeting of the client and consultant.

**Conclusion**

In the production stage we can see that the design for the project was always reviewed by the consultant and client to make the quality workmanship, use of quality materials and making easy of execution.

In tendering process, the contractor was selected among the reputed companies. The consultant prepared time schedule before contracting, so it is to be mentained by the contractor always. Specification and different laboratory test ensured the quality of the materials. Communication between the actors was good, cause of different meetings; taking of decision is very easy without hampering the work.

But some of the lacking of the use of information Technology in contracting, that is computerised planning of resource, required time analysis, finding of different alternative solution by computer are absent here. Otherwise it can reduce the total time and can make the work easy and worthy.

## Property management

Property management is a new concept for our country. In some works in government level this exists, but in private level these are totally absent. Yes we do some kind of management or mentainence, but we cannot call it as property management theoretically. However let's find how these are operating informally.

**Life cycle economy**

Earlier we said that during cost estimation and specification, it was followed by the schedule of rates of P.W.D., then the choice of the client and the consultant were imposed. The P.W.D. rates and specifications are considered as the benchmark in our construction field. But these does not evaluate the running cost or mentainence cost any more. Even it does not considered as the part of investment. In some housing projects, the running cost and the maintenance costs are run by the owner's association, but in commercial projects these are by the owner for outside works of building and by the tenants for inside works of the building. In residential building these are done by the owner of the house. For public buildings, by their respective organisation or the government. But all of these are very very unplanned and not predicted. So none of the projects are considered the life cycle economy formally.

Also we have some running cost for any building, say for electricity, water, sewage system and some taxes, but unfortunately nobody includes these costs with the cost for the project. Nobody is sure how much he has to be pay on monthly or yearly for his project.

**Maintenance planning**

Again to say that there is no maintenance planning done before the project starts or even after completion. Normally maintenance is done once in a year, but most of the case nothing is replaced before any damage. There is no predicted maintenance planning. In our project we have some maintenance for different materials like the tiles, utilities, fittings and fixtures, paint etc, which will be

done by the school authority but not in a very planned way. We have a warranty period for one year by the contractor. So that, for the first year everything beyond contractor's responsibility only for the ware and tier, but not for the regular or daily maintenance.

- The regular or daily maintenance includes cleaning, polishing and maintenance of the floors, fittings, utilities, repairing of small defects, minor replacements etc.
- The yearly maintenance includes the painting, structural repairs, major replacement of fittings and fixtures etc.

But there is no plan for any renovation, alteration etc after a certain period. Until any damages occur nothing is replaced and of course there is no maintenance division for this purpose.

**Connection to the design stage – feedback**

Our project is at construction level; it will be completed at the end of this year 2000. We are still uncertain about the connection between the design stage and the maintenance stage. So it is very difficult to get any feedback.

## Experiences to be used in the future

There are some experiences from the ICM course from which our construction process are far away in some stages. If we analyse these, step-by-step then we can find the lacking.

- In design stage, we have done nothing about the cost for running and maintenance for our project during estimation. Which may create a lot of pressure on the client during its operational period. In the calculation of time schedule or duration of the project, we have done it by manual bar chart. But by using of computer software for time schedule or the production planning we can find the critical period or about the work which can be shift without hampering the cost. Also we can analyse the resources according to works. But these are absent in our project, that's why may be it has taken a more cost and the time also.
- In production stage, we were uncertain which stage of work can be shift or overlap with another works, more accurately. We know when the duration of the construction is lengthy, it costs more. Probably we have taken the largest and safe time frame with a more cost, but it can be shorter and cut down using the production planning software. We do not know how much over costs we are spending. So economic control is little bit beyond control at this stage.
- In property management planning, we have a lot of lacking of knowledge. We do not have any plan like that, we are not sure what is our running cost or how much we have to pay for mentainence or what measures we should take for the mentainence at which period. Everything is very uncertain.

Others are more or less same in procedure in comparison to other countries, but use of information technology for design stage is the good experience for our project, which makes the design easier and cost effective.

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