1.0 Introduction

Whenever, there is a discussion relating to the local construction industry, a point always raised is the lack of performance of local construction contractors. Whatever the outcome of these discussions the professionals always agree that if there is any corrective action(s) to be taken to remedy this situation, it must be done. First of all, it is necessary to identify the problems faced by construction contractors, in order to identify and analyse the factors contributing to construction contractors' management problems. The authors have studied a number of on-going construction projects and also interviewed clients, contractors and consultancy organisations. This paper summarises some of the findings of this study and briefly discusses possible management approaches to overcome such problems.

2.0 Methodology

2.1 Study of Project Reports

The Centre for Housing Planning and Building conducts short term Construction Management Courses for upper, senior and middle level managers in the construction industry since 1979. The general objective of these courses is to enhance the managerial capabilities of the participants so that at the end of the training programmes they will be able to manage the construction projects undertaken by them effectively by adopting proper management, supervisory and control methods during the project implementation. As a partial fulfilment of these courses, the participants are required to study, analyse and present details/information relating to selected on-going projects, so that shortcomings and deficiencies of these projects can be identified and recommendations can be made to remedy such shortcomings and deficiencies.

The authors have randomly selected 39 of these project reports, analysed them and presented the findings in this paper.
2.2 Interviews

Interviews were held with 10 contractors and with 13 representatives from client and consultancy organisations. They were from private sector as well as from public sector organisations. These interviews were conducted in such a way that the results would reflect the qualitative aspects rather than the quantitative aspects.

3.0 Organisations included in the Analysis

3.1 On-going Projects

- 39 Projects have been selected randomly.
  At the time of the study all the projects were under construction and the completed work varied between 20% - 70% of the total work.
- Out of 39 projects, 27 were constructed by 06 government/semi government organisations and 12 were constructed by 11 private sector organisations.
- The individual estimated cost of 20 projects exceeded Rs. 10 Million, 07 projects were between Rs.10-05 Million and the balance 12 were less than Rs.5.0 Million.
- Out of selected 39 projects, 36 projects were on 'measure and pay' basis contracts (admeasurement contracts). 02 contracts were awarded on lump sum basis and one contract was done by the client himself.

3.2 Client/Consultancy Organisations

Interviews were held with 13 client/consultancy organisations and representatives interviewed in these organisations were personally known to the authors and the selection of these organisations was done only on that basis. However, they represented a good cross section of the industry (eg. private, public, large, medium and small etc.). The main objectives of these interviews were to identify the factors contributing to the shortcomings/deficiencies highlighted in the section 4 of this paper.

4.0 Summary of Data Analysis

For easy identification and reference data collected from Project Reports were summarised under the headings given below:

4.1 Project Planning

<table>
<thead>
<tr>
<th>Description of Status</th>
<th>Number of Projects</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No planning at all.</td>
<td>14</td>
<td>36%</td>
</tr>
<tr>
<td>Some Planning Techniques used</td>
<td>22</td>
<td>56%</td>
</tr>
<tr>
<td>Good Planning</td>
<td>03</td>
<td>08%</td>
</tr>
<tr>
<td>Behind schedule</td>
<td>26</td>
<td>67%</td>
</tr>
<tr>
<td>Time Extension Approved</td>
<td>06</td>
<td>15%</td>
</tr>
<tr>
<td>On target</td>
<td>07</td>
<td>18%</td>
</tr>
</tbody>
</table>

**TABLE 1 : STATUS OF PROJECT PLANNING**

As shown on the Table 1, in 14 projects out of 39, no planning work has been done and in 22 projects some planning work was done at the beginning of the projects (eg. preparing a bar chart etc.) but no monitoring work has been done. Moreover, there were a number of shortcomings in these initial planning work, its identification of activities, incorrect logical sequence of activities, unrealistic activity duration, etc. Only in 3 projects some acceptable planning work was done, 67% of the projects (26) were behind schedule and 15% of the projects (6) were on approved extensions. At the time of the investigations only 18% (7) projects were on schedule.

4.2 Resource Scheduling

Out of the 39 projects, only in 06 projects some materials and labour scheduling work had been done and all other 33 projects have not mentioned resource scheduling at any level.

4.3 Financial Planning & Control

The investigation showed that the contractors who had worked in 36 projects had not prepared any type of financial planning or cost control systems in their projects. Most of them had records showing the expenditure of the projects they were handling which was really book-keeping.

Some contractors (3) indicated that they utilize the resources available with them to control the cost of the projects.

4.4 Other Site Management Activities

During the study, the majority (85%) of projects
indicated very poor site planning and organisation. Other aspects such as the management of labour, material and plant and safety were not given adequate attention. Almost in all the projects, safety was an aspect which was never considered.

Other than testing concrete cubes, as and when requested by the consultants, in almost all the projects properly developed quality control procedures were not followed on sites.

5.0 What are these shortcomings?

The results of the analysis of the 39 project reports and data collected during the interviews showed that the factors contributing to construction contractors' management problems are not mainly because of the shortcomings of the contractors alone. As stated below, other parties too are responsible for these management problems.

5.1 Shortcomings of Clients

i) Inability of the client to provide definite project brief to the consultant.

ii) Inability to acquire the necessary land prior to commencing the design work.

iii) Shortage of funds for interim/extra payments is common with public sector clients due to one or more reasons given below:

a) Commencement of projects without treasury approval and/or allocation of adequate funds.

b) Scope of work is not finalised at the time of allocation of funds. (Subsequently, when more funds are requested, request to the treasury is not made at the proper time).

c) All aspects of the projects are not considered during the budget allocation (initial estimates). As a result a number of supplementary estimates are prepared during the construction phase.

d) Fund allocations for construction work in government departments are done on block allocation basis, not project wise. As a result, sometimes distribution of funds is not done properly.

e) The client wants to commence the work without a target completion date, complete design details and tender documents.

f) The client takes the decision to award the contract to the lowest tenderer. (This may be against the consultant's recommendation).

5.2 Shortcomings of Consultants

a) Inability of the consultant to finalise the complete tender documents on the time schedule agreed with the client.

b) Absence of proper site investigation.

c) Inaccuracies and incompatibilities of the tender documents (no proper review done).

d) Adequate time is not given to the prospective tenderers to respond to the Invitation to Bid.

e) Recommendation is to award the contract to lowest tenderer, without considering the past performance of the tenderer.

f) Conditions of the contract adopted by the government departments are favourable to the client, e.g.

i) No interest on delayed payments

ii) Period for certification of bills by consultant is not stated.

i) Inadequate of qualified, experienced staff with the consultant. (Eg. For day to day supervision, certification of interim bills, design work has been done by a draughtsman).

h) Lack of proper co-ordination of projects by consultants (no progress review meetings and site visits at appropriate intervals).

i) The consultant's representative does not visit the site for the inspection of activities such as setting out, concreting etc., unless the contractor provides transport facilities for such inspection.

j) Reluctance to issue written instructions.

k) Procedures/formalities to appoint nominated contractors are not done in time.

l) Drawings are prepared without making adequate site visits/investigations/data collection.

There are two very important factors responsible for deficiencies or faults on the part of consultants for which only the client has to take the blame.

One is the wrong selection of the consultant.

A consultant could be selected broadly on:

a) The firm's general experience in the field of assignment

b) Adequacy of the proposed work plan and approach in responding to the Terms of Reference

c) The qualifications and competences of the personnel proposed for the project

d) The consultant's past performance.

The other factor is the practice among some clients to invite 'bids' for Consultancy Services
and making the selection on price. The small saving that may be achieved may result in a larger project cost or even the project being a total failure if competence is overlooked in preference to the price advantage.

5.3 Shortcomings of Contractors

Shortcomings of construction contractors can be categorised under different stages as given below.

5.3.1 Tender Stage

a) Absence of site visits and adequate investigation before pricing the tender.
b) No analysis done to assess the present financial capability to undertake the tendered project if awarded.
c) No cashflow forecasting is being done.
d) Tender documents are not studied properly.
e) Factors such as availability of work, geographical location, future escalation of prices, and other associated risk factors are not adequately considered during the tendering stage.
f) Programmes have been prepared without giving due consideration to availability of plant and equipment (without considering the delays involved when importing plant and equipment).

5.3.2 Pre Construction Stage

a) Construction Planning

Absence, inadequacy and/or inaccuracy of construction planning covering the following areas:
- Operational Planning
- Resource Scheduling
- Financial Planning

The problems faced by contractors due to the above mentioned shortcomings are:

1) No progress controlling can be done.
2) Difficulty of forecasting the future difficulties.
3) Inadequate knowledge of the required resources such as manpower, material and machinery to complete the project activities as scheduled.
4) No cashflow forecasting has been done, and as a result, the following occurrences are common:
   - Non-availability of finance at the required time.

- Difficulty of justifying the viability of the project to obtain required funds.
- Capital lock-up unnecessarily on resources.
- No basis for cost control.
- In government organisations, no way of taking decisions on unutilised money (if any) until completion of the budgetary period or the completion of the project.

b) Physical Site Layout and Organisation

Most contractors do not consider the importance of preparation of a site layout plan showing the locations of temporary buildings, utilities, indoor and outdoor storage etc., prior to commencing construction. As a result, some of the difficulties/problems contractors face are:
- Double handling of materials
- Difficulties in operation
- Site security problems
- Problems relating to safety
- Materials wastage
- Overall site management problems

c) Staffing and Site Office Organisation

One of the major drawbacks of the contractors is inadequacy of competent staff for site activities with unplanned organisation setup where responsibilities of officers are not well defined. Before commencing the construction work, it is very rarely that contractors identify the workload and employ qualified and experienced staff accordingly.

Most of the contractors do their work through labour sub-contractors and very few have written contract agreements with these sub-contractors. What they have is a piece of paper showing labour rates given by one party and agreed by both parties.

5.3.3 Construction Stage

a) Material and Stores Management

The common problems due to poor materials management noted during the study at construction sites are:
- Non-availability of materials
- High cost and time losses due to last minute ordering of materials
- Materials wastage
- Procurement of poor quality materials

b) Control System
Absence/inadequacy of proper system for,
- Progress control
- Cost control
- Quality control

As mentioned in the section 4.1, even though most of the contractors prepare a bar chart at the beginning of the contract, a very few update or revise it as and when required. Therefore, there is no tool available to them to monitor the progress of the project.

When studies were made of the minutes of site meetings/site correspondence of some contractors, the progress of the construction work was mentioned as percentage wise. Most of the time, this percentage is just purely a guess estimate and not based on factors such as man-days spent, value of the work done or quantity of work done.

Other than the technical specifications prepared by the client/consultant, there is no procedure or checklist developed by the contractor or given by the consultant to ensure that the final product meets required standards.

6.0 Effective Construction Management

When the shortcomings of the consultants and also of the contractors given in the section 5 hereof were investigated, it was observed that the major reasons for those shortcomings are:

- Non-availability of competent staff
- Lack of knowledge in application of construction management Techniques.
- Pure negligence
- Lack of procedures to follow.
- Undertaking work beyond their capacities.

The question is, what approach(s) should the contractor take to completely eliminate or to minimise the above mentioned shortcomings? Whatever approaches/techniques the contractor is going to use in this respect they should provide him warning signals when things are not happening in the right direction, so that he will be able to take appropriate corrective action(s) and push the project into the correct track.

The following sections briefly explain in checklist format, some of the possible approaches available to contractors to overcome shortcomings noted in the paper.

6.1 Tendering Stage

Once a contractor get himself prequalified or registered (as applicable) he should collect the tender documents as early as possible, when they become available. Then he will be able to carry out the following activities as required:

- Cursory review to familiarise himself with the scope of work.
- Decision to tender (after cursory review of the scope of work, if the contractor decides not to submit his bid, he should handover the documents to client/consultant and inform them accordingly).
- Select the tender proposal team and entrust the responsibility(s).
- Study the tender documents in detail and note all factors (eg. Cost, risk, etc.) which will have an effective bearing on the final tender proposal.
- All discrepancies/ambiguities in tender documents should be clarified (may be at the pre-bid meeting or by writing to the consultant).
- If the site visit is not pre-arranged by the client/consultant, the contractor should arrange at least one for himself with a checklist to include but not limited to the following (as appropriate):
  - Food levels and their frequencies.
  - Existing underground and overhead utilities.
  - Ground conditions (type of soil, water table, etc.) to decide on surface drainage, septic pits, type of shoring, dewatering etc.
  - An assessment of availability of labour in the area.
  - An assessment of locally available materials (borrow pits, quarries etc.)
  - Security arrangements of the site
  - Disposal areas
  - Facilities for workers (accommodation, food, transport, etc.)
  - Existing facilities and any demolition work.
- Decision on the mark-up.
- Preparation of total estimate to include
  - Labour
  - Material
  - Plant & Equipment
  - Sub contractors
  - Overheads
  - Preliminaries

(The estimator should take advantage of available
resources with the company, if any).

- Prepare
  - Programme of work
  - Cashflow forecasting.
- Obtain bank bonds/guarantees as required.
- Off record work:
  - Study the marketing situation
  - Information relating to other prospective bidders
  - Client’s priorities (cost, time, quality)
  - Financial agencies (direct finance by the client or funding from other agencies) of the project.
  - Client’s organisation set-up.
- Prepare a checklist giving details of what information, and documents are to be submitted with the proposal and use this checklist to ensure that the proposal is responsive to the invitation to bid.

6.2 Pre-Construction Stage

When the proposal is accepted by the client, prior to commencing the construction, the contractor should:

- Restudy the proposal submitted by him and make notes on critical items/activities.
- Identify headoffice support.
- Select/Recruit site staff and identify their duties & responsibilities.
- Check that the appropriate approvals from local authorities have been taken. (This may be the work of the client/consultant, but no-harm checking).
- Arrange required insurance policies, bank guarantees.
- Ensure that the formal contract between the client and the contractor has been formally executed.
- Prepare a detailed construction programme identifying the activities and arranging them in correct sequence. (Also identify major milestone dates).
- Prepare cashflow forecasting for the project and cumulate it with the company cashflows. (Cashflow forecasting will be required by the lending agencies to borrow money).
- Obtain (if available) advance payments and prepare a programme showing how this money will be available to the project as and when required.
- Identify and have formal contracts with:
  - Material suppliers
  - Plant hirers
  - Sub contractors
  - Site staff and labour (if newly recruited)
  - Labour
  - Material
  - Plant
  - Sub contractors
- Prepare site layout plan and also sketches for temporary structures.
- Identify interfaces with other contractors (if any) and make notes on the construction schedule accordingly.
- If the site levels have not been taken, it is advisable to do the site survey and obtain the concurrence from the client/consultant. (This may help to resolve future disputes).
- Develop a construction safety programme to be implemented during construction.

6.3 Construction Stage

- Maintenance of the document control system (keep every record updated and at the correct place).
- Monitor (weekly/fortnightly/monthly)
  - Construction schedule
  - Cashflow forecasting
  - Material schedules
  - Labour schedules
  - Plant & equipment operation and maintenance schedules.
  - Quality Control Procedure
  - Safety Programme
  - Sub contractor performance
  - Interfaces with client, consultant, other contractors, local authorities where necessary and take appropriate action(s) where necessary.
- Prepare short term construction plans (weekly) in consistence with the master construction programme and discuss these short term plans with the supervisory staff and instruct them to implement accordingly. (Informal/formal discussion with the site staff regarding weekly/fortnightly progress and the next week work load).
- Ensure that minutes of the site meetings, site instructions, variations to construction have been informed/distributed among the site staff without any delay for their actions.
- Keep well maintained records of all site instructions given by the client/consultant.
- If the verbal instructions given by the client/consultant were not confirmed by them in writing subsequently, write to them acknowledging their instructions.
- Make sure that the interim bill leaves the contractor’s table without any delay.
- At the beginning of the construction, agree
to take joint measurements for interim bills and get familiar with the approving/certifying procedure of the bills. When submitting a bill, make follow-ups to check on whose table bill is lying.

* Make periodic checks to ensure that,
  - that labour productivity is at high level at all the times
  - material wastage is minimum
  - maximum utilization of plant and equipment (maintenance work is properly done)
  - site security is at higher level
  - records are kept up-to-date
  - client’s/consultant’s inspection has been done as required
  - welfare of the workers is maintained at a higher level
  - sub contractors have paid their workers and suppliers
  - site safety is at an acceptable level.
  - Ensure that construction claims have been submitted with proper and adequate data for review and approval.
  - Maintain data relating to cost, labour productivity (for future reference and to justify construction claims).
  - Take photographs wherever possible showing the site construction activities.
  - Note all 'as - built' conditions on a set of drawings during construction.

6.4 Construction Completion Stage

* Once the construction is completed (may be substantially) persuade the client/consultant to have a joint inspection as early as possible.
* Agree to a punch-list prepared during the final inspection.
* Make follow-ups to obtain the completion certificate of the construction.
* Ensure that the final bill has been prepared without any omissions of the work done.
* Prepare a demobilization plan (if appropriate obtain the client/consultant approval) and act accordingly.

* Handover
  - 'As-built' drawings
  - Operation manuals
  - Spare parts
  - Warranty certificates
  - Maintenance instruction of plant and equipment to the client and obtain signatures accordingly.

* Arrange to store the important historical data/files in such a way that quick retrieval is possible when required.

6.5 Maintenance Stage

* Attend to maintenance/defects work as early as possible during the defects liability period as required by the conditions of the contract.
* Make follow-ups to obtain the retention money and the maintenance completion certificate when the liability period is over.
* Request and obtain letters from the client and the consultant including the following information and keep those letters in the head office files.
  - Name and address of the client
  - Name and address of the consultant.
  - Funding Agency
  - Brief note on scope of work
  - Project value and construction period
  - Contractor’s performance
  (These letters will be very useful when preparing prequalification documents for future work)
* Ensure that original of bank bonds/guarantees, insurance policies have been handed over to their issuing agencies at appropriate time.

7.0 Training

Training is one of the important and effective tools available to contractors to ensure that their staff is capable and also will use professional construction management techniques when handling the projects. The training can be done in-house and/or using training programmes conducted by external agencies. Even in a well established major construction company, it is difficult to run in-house training programmes to satisfy their total needs. Therefore, the best way is to encourage the staff to participate in workshops/seminars/training courses conducted by external organisations such as The Institution of Engineers, The Institute for Construction Training and Development, The Centre for Housing Planning and Building, The University of Moratuwa and The Open University (Certificate & Post Graduate Courses), etc. The training programmes conducted by these institutes not only provide new knowledge to participants but also provide a forum for discussion to share their experience.

8.0 Services of Consultants

It is not always possible even for some of the larger firms of contractors to have in-
house staff competent and experienced in the particular type of work involved in the project and in Construction Management. The smaller firms may not be able to meet the cost in-keeping such staff particularly when the scope of work is limited. Furthermore, the number of experienced personnel available in the country is not unlimited. Therefore, the contractors will find it a definite advantage to utilise the services of suitable consultants for Construction Management. This is one of the proposals included in the Cabinet Memorandum on the Local Construction Industry which has been accepted by the Government.

9.0 Conclusion

From the study of the on-going construction projects, we are convinced that there are a number of shortcomings in construction management. For these shortcomings, not only the contractor, but the client and the consultant are also partly responsible. On the contractor’s part, what is left to him to ensure that his organisation will not face surprises is to utilize professional construction management practices at every stage of the project. In that regard, the authors feel that check lists provided in this paper will provide some guidelines to contractors.

Employing effective construction management techniques in construction is not a easy task. It needs commitment and dedication. Like in everything else in this world, to obtain good results at the end of the day prior hardwork is necessary.

10.0 Acknowledgement

The authors wish to express their thanks to their colleagues in client/consultant/contractor organisations, who spent a number of hours with them discussing matters relevant to the topic and also to the participants of the CHPB Training Courses, whose reports were the basis of some of the findings of the study.

11.0 References

1. 39 Project Reports prepared by participants of the courses (1985-1988) conducted by The Centre for Housing Planning & Building and The Institute for Construction Training and Development.