

Chapter 5

CONCLUSION AND RECCOMMENDATION

5.1 GENERAL

This thesis was prepared in order to develop the working system and method to estimate design and supervision cost of A Engineering Consultant Co., Ltd. Primary sources of data of this thesis were technical books, papers and journal related to the project management and construction cost estimating, federal government studies and standards, papers and journals prepared by engineering association in Thailand, and data base in Dynamic Engineering Consultant Co., Ltd. Some data are the feedback from the questionnaires distributed to more than fourty design firms in Thailand. Most of the design firms being studied in this thesis are located in Bangkok.

5.2 CONCLUSIONS

From the data base in A, data in technical books and feedback from the distributed questionnaires, The project planning and control system, and method to estimate design and supervision cost are developed as follows:

5.2.1 Project Planning and Control System

After winning the bidding, the project planning to complete the works in time, in budget and meet the client's requirements are concluded in steps as follows:

- (I) Project manager allocate human - resources for the project.
- (II) Project manager conduct kick - off meeting.
- (III) Project manager make and distribute Design Work Scope, designers study Design work Scope and make Data Acquisition if necessary.
- (IV) Project manager conduct internal meeting.
- (V) Project manager make the Work Schedule.

- (VI) Each chief designer make Design Criteria and Conceptual Design. Then, he distributes works for each junior designers.
- (VII) Junior designers make Preliminary Design and chief designers perform the quality check and technical check.
- (VIII) Project manager collects all drawings and calculation sheets then issue to client for approval.
- (IX) Junior designers make Detailed Design and chief designers perform the quality check and technical check.
- (X) Project manager collects all drawings and calculation sheets and then issue to client for approval.
- (XI) All of drawings are submitted for bidding and for construction.
- (XII) Supervising team perform the supervision work. Some drawings are revised according to changes or data in construction site
- (XIII) All of final drawings are issued to client.

In this developed system, the internal meeting before starting design work, design work scope, data aquisition, design criteria, conceptual design, formal work procedure, formal checking system, standard form of drawings, calculation sheets and electronic files and work split up in construction site are developed. This working system is developed in order to eliminate the weak points and disadvantages from the existing system. Quality, cost and time will be effectively controlled in this developed system.

5.2.1.1 Quality Control

The products of A are drawings, electronic files, calculation sheets and supervising service. The quality of these products will be checked in the developed system. The chief designer will check the drawings and calculation sheets both qualitative and technical items every week. The design criteria, calculation sheets are in standard form. The drawings are in the same pattern. The drawings in electronic files are made according to the same standard.

Quality of products is very important for A. If the quality of products do not meet the clients' requirements, they will blame the company. It is difficult to win their projects in the future. Quality of products affect the image of the company. In engineering consultant business, the image of the company is very significant.

5.2.1.2 Cost Control

Money is one of the most important factors for A to survive in the business. DEC has to control the cost of design and supervision in order that it does not exceed the proposed cost which the company charge from the client.

In developed system, the cost of re - design will be reduced. All designers will understand the overall work. The contrast between departments will be eliminated because of good communication and coordination system.

The direct communication between the designers and site engineers can reduce the overhead cost for revising drawings. In the existing system, the drawing revision required long time and many persons to be involved. Not only the cost of drawing revision, but also the cost of solving problems about the drawings in construction site will be reduced by the direct communication.

The weekly meeting in design process and supervision process will help the project manager to receive the accurate data about the cost which has been spent in the project. By these data, the project manager can control the cost effectively.

5.2.1.3 Time Control

Punctuality is a significant factor for good image of the consultant companies. The company has to do its best to complete the project in time. In factorial project, the clients have also set their own schedule according to the consultant company's schedule. If A cannot complete its work according to the schedule, the client cannot start the operation according to their plan.

In developed system, the time for re - design will be reduced. The drawings and calculation sheets will be check once a week. Therefore, any errors will be corrected before they affect other drawings and cause long time to be corrected.

Weekly meeting in design process and supervision process help the chief designers and project manager to control the time. They will see the progress of work closely and solve any problems before it affect the schedule.

The direct communication between the designers and site engineers is helpful for reduce time for drawing revision. The LAN system in head office is useful for reduce time for coordination between departments.

5.2.2 Method to Estimating the Cost of Design and Supervision

In this thesis, the “Activity Breakdown Estimating Method” is developed for estimating cost of design and supervision in A. By this method, all costs of design and supervision will be estimated in detail. The most important component of the design and supervision cost is the cost of total design and supervision effort or total man-hours / months required to complete the project. The procedure to estimate the cost of total design and supervision effort is developed from the conceptual estimate, but the work schedule will be made and the total effort for the activity will be estimated for all the persons included in the project. Then, the estimated cost of reimbursement and tax will be added to the cost of total efforts in order to determine the total design and supervision cost.

Therefore, the cost of design and supervision can be seperated into three parts.

- i) Cost of total design and supervision efforts
- ii) Reimbursable cost, and
- iii) Tax cost

The activity breakdown estimated method will be used in order to estimate the cost of design and supervision in details. This method is estimate the cost of design and supervision in details. This method is suitable to be used in complicated projects like factory. This method is also useful for using as a base plan for project planning.



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The Differences between Existing System and Developed System

Items	Existing System	Developed System
Quality Control	<ol style="list-style-type: none"> 1. No standard of checking system 2. Check after the works are completed 3. No standard of design criteria, calculation sheets, drawings 4. No conceptual design from chief designer 	<ol style="list-style-type: none"> 1. Checking system is standardization 2. Minor check every week 3. Design criteria, calculation sheets and drawings are standardization 4. Conceptual design is made by chief designer
Cost Control	<ol style="list-style-type: none"> 1. No weekly meeting in design process 	<ol style="list-style-type: none"> 1. Weekly meeting in design process supervision process 2. Cost of Re-design and Re-work will be reduced because of effective communication and coordination system
Time Control	<ol style="list-style-type: none"> 1. No weekly meeting in design process 	<ol style="list-style-type: none"> 1. Weekly meeting in design process and supervision process 2. Time of Re-design and Re-work will be reduced because of effective communication and coordination system
Method to estimating the cost of design and supervision	<ol style="list-style-type: none"> 1. The activities in work procedures are not considered 2. Only the man hours of key staffs are considered in details 	<ol style="list-style-type: none"> 1. The purposed work schedule is made so the activities in work procedures are considered. 2. The man hours of key staffs and supported staffs are considered in details

Items	Existing System	Developed System
		3. The estimation method can be used as a base plan for project planning 4. Flexible to adjust cost to compete with others
Total time of case study project	1. 21 months as a plan 2. 24 months in practice	2. 24 months as a plan
Total cost of case study project	1. 21, 307, 632 baht as a plan	2. 25, 226, 994 baht as a plan