TENDERING AND ESTIMATING FOR CIVIL ENGINEERING PROJECT

ZAIDI BIN ALWUI

Universiti Malaysia Sarawak
1998

Approval Sheet

This project report attached hereto, entitled " **Tendering And Estimating For Civil Engineering Project**" prepared and submitted by Zaidi Bin Alwui in partial fulfilment of the requirement for the degree of Bachelor of Engineering (Civil) is hereby accepted.

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Judul: Tendering And Estimating For Civil Engineering Project

SESI PENGAJIAN: 1998/1999

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Specially dedicated to my loving parents, Alwi @ Alwui Bin Hamdani and Masneh Binti Basri, to the rest of my family and my relatives.

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September 1998

Abstrak

Anggaran kos merupakan suatu perkara yang amat penting dalam sesuatu projek pembinaan. Ini kerana ianya melibatkan soal kewangan dan sekiranya kos sesuatu projek melebihi dari anggaran awal maka adalah agak sukar untuk meneruskan projek pembinaan tersebut. Oleh itu itu anggaran kos projek diberikan keutamaan dalam melaksanakan sesuatu projek pembinaan.

Sebelum sesuatu projek pembinaan seperti pembinaan bangunan, jalanraya, jambatan dan sebagainya, ianya mestilah melalui proses penganggaran kos projek terlebih dahulu. Anggaran kos projek adalah bertujuan untuk mendapatkan anggaran kasar berkenaan kos sesuatu projek yang dicadangkan. Sekiranya anggaran awal menunjukkan bahawa kos untuk membina projek tersebut adalah mencukupi, maka projek tersebut bolehlah dilaksanakan.

Terdapat beberapa peringkat dalam membuat anggaran kos untuk sesuatu projek. Biasanya anggaran kos permulaan dibuat berdasarkan kepada luas kasar permukaan per meter persegi setelah lakaran kasar pertama siap dibuat oleh Arkitek. Kemudian, berdasarkan kepada anggaran kos dari projek terdahulu yang lebih kurang sama dengan projek yang dicadangkan digunakan sebagai asas untuk membuat anggaran kos bagi projek yang dicadangkan dengan mempertimbangkan turun naik kos disebabkan keadaan pasaran semasa. Setelah itu, anggaran kos yang lebih terperinci dibuat setelah lukisan yang lebih lengkap siap di buat.

Abstract

Cost estimate is an important aspect in the construction project. This is because it involves the financial flow and if the cost of the project exceed the estimate, the construction works become difficult to maintain. Thus, the project cost estimate is given priority in implementing the construction project.

Before the construction projects such as building construction, roads, bridges and etc, its must go through the cost estimating process. The purpose of cost estimate is to obtain the gross estimate regarding the proposed cost project. If the preliminary estimate shows that the cost to build the project is feasible, then the project can be implemented.

There are several stages in the cost estimating process. Normally, the preliminary cost estimate is made based on the gross floor area per meter square following the first sketch drawing prepared by an architect. Then, based on the previous project cost estimate, which is more or less similar with the proposed project, is used as the basis to make the project cost estimate by considering the cost fluctuation in the current market price. When a more complete drawings are available, a more detailed cost estimate will be implemented. The drawing will be divided into the elements such as frame, external wall, internal wall and etc. Then, the elements will be taken off and the quantities multiplied by the current cost rate. A very detailed cost estimate will be available from the completed set of the drawings.

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CHAPTER 1

INTRODUCTION

1.1 General Overview

Cost estimate is a major part in the building construction. The cost estimate is normally done by a Quantity Surveyor. The Quantity surveyor is a qualified and trained professional who is eligible to make the cost estimate. But many engineers, clients, contractors or any peoples can do the cost estimate but the scope that they can estimate is limited. For the quantity surveyor, they can make a detailed estimate from cost planning stage until the cost control stage.

Basically, there are two primary part of estimate which are measurement and pricing. The measurement is the first step of estimate where the estimator will measure the approximate quantities for the certain parts of the building such as for walls, floors, roofs and etc. All of these items will be estimated as meter square, meter cube and length. For certain materials such as for reinforcement bar, the estimator will measure the length of bar and then converted to the tons or kilograms. The measurement also involve the labor, equipment, services and etc. After the measurement, then the second part of estimate which is pricing will be done. The pricing is the degree of approximation is even greater because of the difficulty in predicting all the probabilities of such things as labor productivity and also site conditions. The ability to predict probabilities largely depends on the information and data available from the experience and the estimator's intuition.

The purpose of estimating is to determine the forecast costs required to complete a project in accordance with the contract plans and specifications. For any given project, the estimator will do the cost estimate process from inception stage (or analytical cost) until the tendering stage (before the project awarded to the contractors). In the feasibity stage or inception stage, the estimator will just make a rough estimate. At this stage, there are several types of estimate to determine the gross estimate. The comparison with the past project is popular type of preliminary cost estimate nowadays. The estimator must consider the present materials price market while doing the cost estimating process. In the preliminary estimate, some estimators will just add a certain percentage for the market price. If the preliminary cost estimate is still within the client budget, then the client will make a decision to proceed with the project. In the definitive estimate types, the approximate quantities will be done more detailed and the elemental methods is the popular method used nowadays. Every part of building will be broken into floor area, wall area, roof area and etc. All of these parts will be priced separately. The price rates for the materials can be obtained from the present market price.

There are many items that influence and contribute to the cost of a project. Thus, each item normally must be compiled and analyzed. The items such as labor, contingency, allowances, escalation, overhead, profit and etc will be taken into consideration while doing the cost estimating process.

When the cost estimate reach the detailed estimate stage, then the estimate will be prepared from the working drawings and specifications of building. The working drawings usually contain information relative to design, location, dimensions, and construction of the project. The specifications are a written supplement to the drawings and include

information pertaining to materials and workmanship. The working drawings and specifications must be considered together when an estimate is being prepared.

Estimating the cost of a project is a process subject to many variables that may affect the actual construction of the project. These include weather, transportation, soil condition, labor strikes, material availability and also subcontractors available. Regardlessof the variables involved, the estimator must strive to prepare as accurate an estimate as possible. With a carefully organized work, based on the estimator's best judgment and records of past projects completed, will result in accurate estimate.

There are three matters that estimator must take into consideration while doing the cost estimate. The three matters are explicit, logical and consistent. The estimate must be written down with explicit, logical and consistent and it must explain what is going on. The estimate also must be logical. It must move from one point to another, it should follow a system where this system must be logical. The estimate also must be consistent. It must be consistent within itself, in other words the estimating must always be done in the same way and it must be consistent with other work that has been done in the past and that will be done in the future.

1.2 Specific Aim.

The specific aim of this project is to determine that how the estimators conduct the estimating process from the inception stage until the tendering stage of the project in aspect of cost estimate implementation. The author will also look into the types and methods of estimate conducted by the estimator. Some calculations and datas will be showed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction.

Generally, there are two types of estimates which are Preliminary estimate(sometimes called approximates, conceptual and budget estimates) and detailed estimates(sometimes called final or definitive estimates). There are three parties involved in the estimating process that is, owner(sometimes called client), designer/consultants and contractor. Each has responsibility for the estimating costs during the various phases of the project. Early in the project, the owner must do the analytical costs(the owner may ask some experts to do this analytical cost). Then the prospective owner may wish to know the approximate cost of a project before making a decision to construct it. The designer must determine the cost of various design alternatives in order to finalize the design to satisfy the owner's budget and desired use of the project. Then, the contractor must know the costs required to perform all work in accordance with the final contract documents.

2.2 Phases of estimates.

Phases in the estimating process are important to determine that the cost evaluation of certain projects can be done systematically and in the proper order. Figure 2.1 below shows the simple phases of estimating of the project costs.

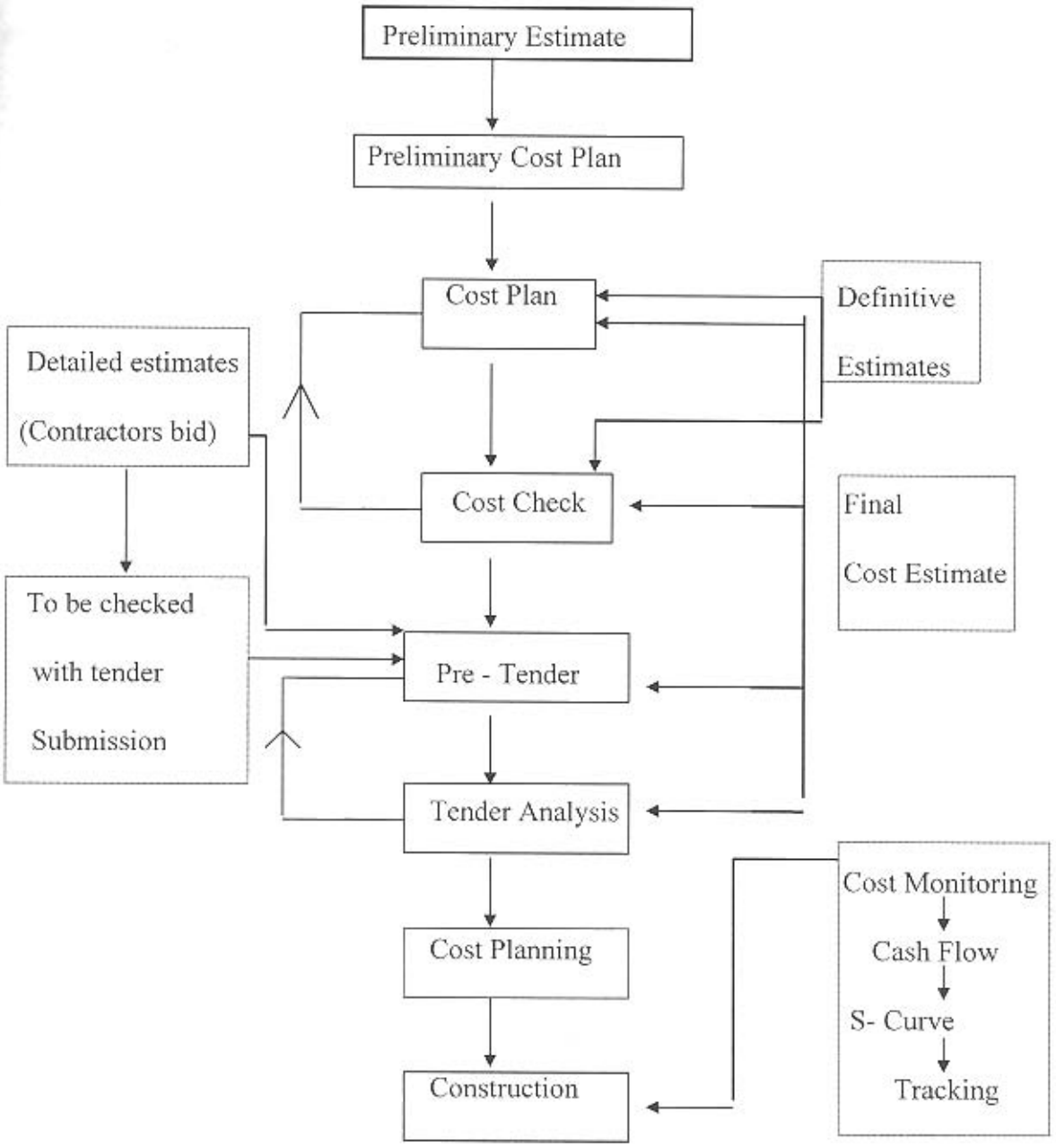

Figure 2.1 Phases of estimates

Preliminary estimate is to forecast the cost of the project with the very little information. At this stage, there are no drawing prepared and only the vaguest of information are required at this stage. The estimator supplies cost information normally

based on the actual costs of previous buildings of similar type. The location, site condition, market condition and also quality of work for the project suggested must be taken into consideration while doing the estimating cost at this stage. Preliminary estimates also can be done by using the superficial rates of the building. Example, superficial rates per floor is RM15,000.00. If the building is 4 storeys, thus the estimated cost for the building is RM60,000.00 (RM15,000 X 4).

Preliminary cost plan is also to forecast the cost of the project. But at this stage, some drawing will be produced and the estimator will be in a position to give general guidance on costs and, in particular, to evaluate the financial effect of different solutions to any specific design problem and the estimator often prepares an outline cost plan.

Cost plan needed a more detailed design . At this stage, sketch plans are now finalised and some working details are prepared. Outline schemes will be prepared by consultants with provisional estimates supplied in some cases. The quantity surveyor will provide comparative costs of different forms of construction, materials, components and service layouts and will adjust the distribution of costs in the cost plan if required. Continuous cost checks by the quantity surveyor will ensure that the development of the design remains compatible with the cost plan. When all the design drawings have been prepared and also cost checked, then the final cost review should be made by the quantity surveyor and the report submitted to the architect.

When the final costs have been agreed, then the pre-tender stage will be implemented. The contractors who are interested to do this project will do their own estimating with be given the detail drawing. The contractors will use the detailed estimate to estimate the project cost. The contractors then will submit their tender to the client

within the certain period of time given. After all the contractors submit their tender, then the tender evaluation report will be made by the consultants. This is called tender analysis. Normally the contractor offering the lowest cost of project will be selected.

The contractor winning the tender will do the project planning to implement this project. The project planning include the work programme which shows the budgeted cost of project for every element of the project. They also will prepare the time cost envelope which show the budgeted cost in the form of s-curve. Finally, the contractor will do the construction works and during the construction the contractor will always monitor the cost of the project in order to prevent the cost overrun of the project. The contractor will be able to determine the actual cost of the project by such monitoring.

Figure 2.2 shows the estimated accuracy range during the project phases.

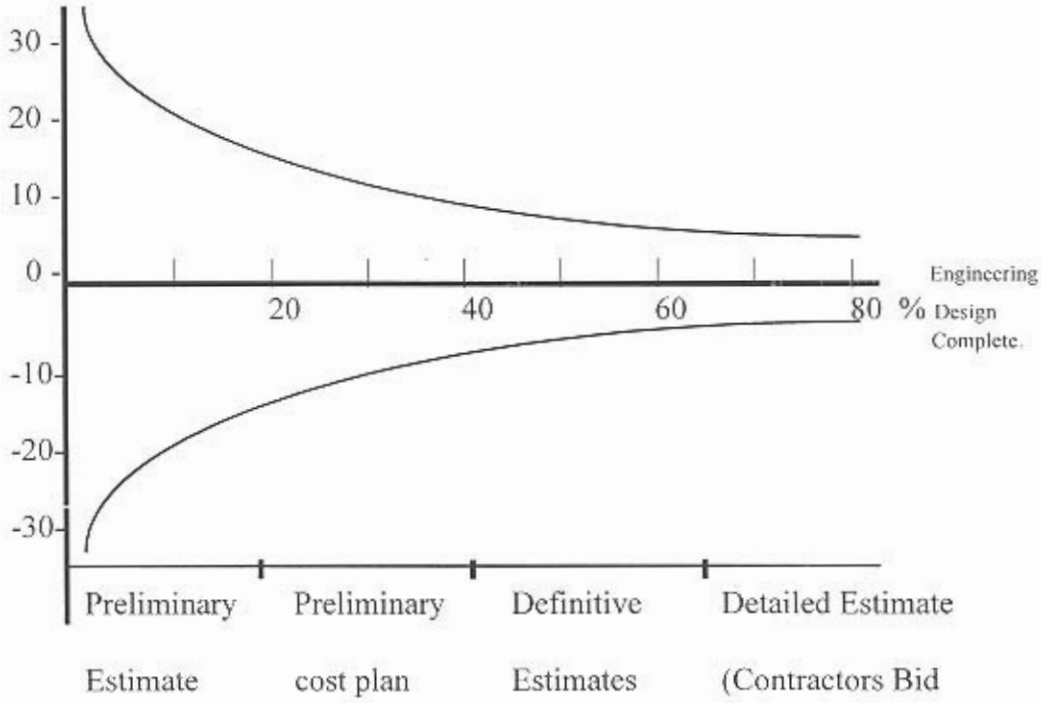

Figure 2.2: Estimated Accuracy Range During Project Phases (Slattary, 1978)

According to the Slattary diagram above the estimated accuracy is ranging between +30% and -30%. The accuracy of preliminary estimate is less than the preliminary cost plan. The more detailed estimate with the some drawing available, make the preliminary cost plan become more accurate than preliminary cost plan. These also same with the definitive estimate and detailed estimate.

2.3. Cost planning process.

The cost planning process have 6 stages which are inception, feasibility, outline proposals, scheme design, detail design and production information. Figure 2.3 show the steps of cost planning process.

The figure 2.3 shows the sequence of design team's work

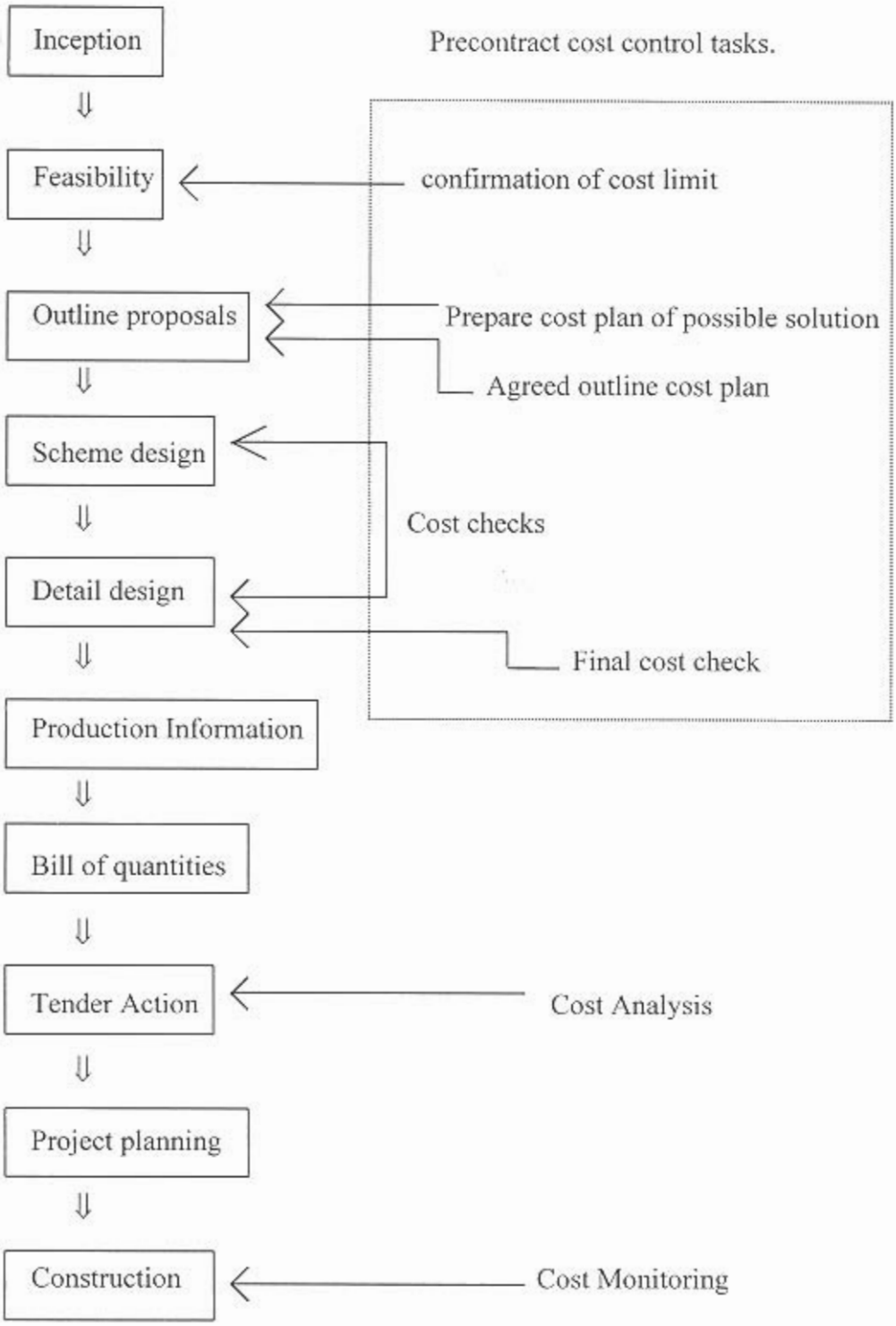

Figure 2.3 Sequence of design team's work

2.3.1 Inception stage.

This is the first stage in the design of the building contract when the client meet the architect and tell him what he needs and give some information such as :-

i.Client need > For instance what is area of floor needed.

ii.Target cost > Money available for this project. Is it enough for the project suggested?.

Initially, the client want to know the cost of the project that can fulfil what he needs before executing the project. The client may want to know what is can be gotten from budget given. At this stage the quantity surveyor should not give the fixed estimate cost to the client. The quantity surveyor just mention the cost analysis which is already done for the similar project in the past. This can give the client the view regarding the range of cost of the project.

At this stage also, the setting up of the admistrative organisation and the appointment of the architect and other members of the design team will be performed. The architect will require a site plan, details of preliminary items, erection times and any cost limits.

2.3.2. Feasibility.

The architect and the employer are endeavouring to establish the employer specific requirements. The design team will be formed to design the building that can really fulfil the client needs and they also will issue the feasibility report to the client. The design team is associated by the architect, engineer, quantity surveyor and specific sub contractor representative.