

COST CONTROL IN CONSTRUCTION PROJECT OF THE SITE

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ABSTRACT

Cost control is an important issue in construction project management. It is widely practiced by contractors in Malaysia and needs to carry out throughout the life of a project. A brief interview with a class A contractor found out that the contractor lack the knowledge of cost control system. Hence, a study is carried out to study the cost control method in a construction project, to identify the cost control method frequently used by class A contractor during the construction stage and to identify the problem faced by the class A contractor in controlling the costs on site. The study is carried out in the district of Batu Pahat, Kuantan, and Muar. A total of 20 questionnaires were sent to the class A contractor and the data analyzed using the average index and frequency analysis. From the study, the main problem faced by the class A contractor are shortages of material, labor or mechanical plant, difficulty in collection of cost data, ever-changing environment of construction work, qualified expertise, duration of the project and additional costs to carry out the cost control system.

ABSTRAK

Kawalan kos merupakan suatu isu yang penting dalam pengurusan pembinaan. Ia banyak dilakukan oleh kontraktor di Malaysia dan perlu dijalankan dari semasa ke semasa sehinggalah suatu projek tamat. Suatu temuduga yang ringkas dilakukan dengan kontraktor kelas A mendapati mereka tidak mempunyai pengetahuan yang cukup dalam sistem pengawalan kos. Oleh sebab itu, suatu kajian dilakukan untuk mengkaji cara-cara kawalan kos dalam suatu projek, mengenalpasti cara-cara kawalan kos yang biasa dijalankan oleh kontraktor kelas A semasa fasa pembinaan dan mengenalpasti masalah yang dihadapi oleh kontraktor kelas A untuk pengawalan kos semasa pembinaan di tapak. Kajian ini dilakukan di daerah Batu Pahat, Kuantan, dan Muar. Sebanyak 20 borang soal selidik dihantar kepada kontraktor kelas A dan data yang diperolehi dianalisis menggunakan kaedah purata indeks dan relatif indeks. Daripada kajian yang dilakukan, didapati masalah utama yang dihadapi oleh kontraktor kelas A adalah kekurangan bahan, pekerja atau loji pembinaan, kesusahan pengumpulan kos data, persekitaran kerja pembinaan yang sentiasa berubah, professional yang berkecualan, tempoh projek dan kos yang berlebihan dalam menjalankan sistem pengawalan kos.

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LIST OF SYMBOLS

Σ	-	Sum
n_x	-	variable expressing the frequency of response for $i = 1,2,3,4,5$
%	-	percentage

LIST OF APPENDIX**APPENDIX****TITLE**

A

Questionnaire form

CHAPTER I

INTRODUCTION

1.1 Introduction

The cost control is a process that should be continued through the construction period to ensure that the cost of the building is kept within the agreed cost limits. The cost control can divide into two major areas; the control of cost during design stages and the control of cost by the contractors once the construction of project has started. According to Nunnally (1998), cost control of a project involves the measuring and collecting the cost record of a project and the work progress. It also involves the comparison of actual progress with the planning. The main objective of cost control of a project is to gain the maximum profit within the designated period and satisfactory quality of work.

1.2 Statement of Problem

A brief interview with a class A contractor found out that they faced problem in carrying out the cost control system. Lack of knowledge and training is main problem faced. Thus, a study is carried out to know the how is the situation of cost control system in class A contractor in construction project of the site.

1.3 Objectives

The objectives for this research are:

- a) To study the cost control method in a construction project.
- b) To identify the cost control method frequently used by class A contractor during the construction stage.
- c) To identify the main problem faced by the class A contractor in controlling the costs on site.

1.4 Scope of study

The study is carried out in the district of Batu Pahat, Muar and Kuantan and involves the class A contractor. The study only covers during the construction phase and not in bidding and design phase.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

The cost control is a process that should be continued through the construction period to ensure that the cost of the building is kept within the agreed cost limits. All expenditure limit control must be related to the functional requirements of the particular building type, but it is perhaps less obvious that functional cost limits may be expressed in a variety of units.

The cost control can divide into two major areas; the control of cost during design stages and the control of cost by the contractors once the construction of project has started. In most cost control procedures, the limit on the expenditure is coupled to a requirement that the building will provide some specified minimum area, to ensure that the building will contain sufficient accommodation to meet its brief. Where control is based on schedules of accommodations, these schedules are usually expressed in terms of the net areas of the usable or scheduled rooms.

The main aims of the cost control are probably:

- a) To give the building client good value for money- a building which is soundly constructed, of satisfactory appearance and well suited to perform the functions for which it is required, combined with economical construction and layout.
- b) To achieved a balanced and logical distribution of the available funds between the various parts of the building. Thus, the sums allocated to
- c) Cladding, insulation, finishing, services and other elements of the building will be properly related to the class of building and to each other.
- d) To keep total expenditure within the amount agreed by the client, frequently based on an approximate estimate of cost prepared by the quantity surveyor in the early stages of the design process. There is a need for strict cost discipline throughout all stages of stages of design and execution to ensure that the initial estimate, tender figure and final account sum are all closely related. This entails a satisfactory frame of cost reference (estimate and cost plan), ample cost checks and the means of applying remedial action where necessary (cost reconciliation).

2.1.1 Definitions

It is better if we look in detail in definitions of the terms used in control procedures since it is widely used and have a different meaning. The following are the definitions of terms related with cost control procedures:

Table 2.1: Definitions terms used in cost control procedures

Terms	Definitions
Budget	A plan for future against actual results can be measured
Cost	Value for a purchaser to pay for goods or a service.
Cost analysis	Subdivision of cost under different elements of the contract or construction.
Costing	Analysis of the expenses so it can be allocated to different contracts, processes, or services, with the aims of ascertaining cost
Cost control	The process of controlling the expenses of cost in a project, from the starting of client's idea to the completion and final payment on site.
Standard costs	Costs of standard outputs for plant or labor under particular conditions of environment.
Unit costing	Estimating the cost per unit, whether this is a square meter of formwork, a cubic meter of concrete or a cubic meter of excavation.

2.1.2 Statement of facts in cost control

According to Nunnally (1998), cost control of a project involves the measuring and collecting the cost record of a project and the work progress. It also involves the comparison of actual progress with the planning. The main objective of cost control of a project is to gain the maximum profit within the designated period and satisfactory quality of work. A systematic procedure of cost control will give a good result in collecting important cost data in estimating and controlling of the costs of the coming projects in future.

Kwayke (1997) explain that the cost control can define as a process where construction cost of a project is manage with the best method and systematic in order that the contractor would not suffering the loss when doing the activities of the project

and the cost construction of a project would not be over-estimated by the developer. Mueller (1986) states that the cost control is the ability to influence the final cost of project positively with modifying negative performance trends.

According to Ritz (1994), cost control though namely easy, but it gives a different meaning to different people. Some people engage it with engineering costs; some states that it is a cost report, value engineering, cost management etc. Cost control involves all the activities above in different time. All the parties involved in a project have their own responsibilities and roles in reducing and controlling the costs.

Austen and Neale (1984) states the main purpose in cost controlling for a construction project should be active controlling of final costs for owner, and not just to record and registering the payment.

2.2 The use of cost control

Amount of detail and the time interval between cost control reports must be considered, which is different according to the level of management for which they prepared. For a site manager, it is necessary to receive the cost report on weekly basis.

After preparing the reports based on the cost data collected, it is important to project the costs into future and to estimate or re-estimate the cost of the work yet to be completed. Any new information must take into account since the commencement of the contract. Thus, a suitable reporting system is important part of a cost control system. The estimator would become more reluctant in the future to use cost data that have been fed back from the site if an adequate reporting system is used. In addition, the estimator can save some time to determine sufficient detail about the data and conditions they acquired.

There are two areas within to check whether the cost control reporting system is efficient or not. First, is to check on the profitability of the work. The value of the work that will be returned is compare with the cost of the work that was carried out. This is a straightforward comparison between the valuation figure and the total expenditure to check on profit or loss if no detailed cost control is used.

The second would be check on efficiency, carried out against the standard of the output rates that were used by the estimator in compiling the estimate. Efficiency is concern with the site management and supervisory staff, whereas the profitability is concern with the contract management level and above.

Upper levels of management will usually paid attention to the contracts that show minimum or negative profitability. It is because they will have to investigate the costs in more detail to locate the particular operations through inefficiency or under pricing, are the cause of the problem.

2.2.1 Unit costs

Unit cost is a noteworthy way of using cost information. The unit cost for any item or operation is the direct cost for one unit of measurement for that item. In this way, it is important to make sure that the actual work carried out directly and the quantity is measured accurately.

Consideration in 'give and take' method of interim measurement must be taken in order to avoid the clash with the calculation of unit rates and results in temporarily high or low unit cost for a particular item. In calculating the unit rates must be solely to the work under consideration. It is important that the supervisory staff do not allocate the hours when their operatives are not properly and efficiently employed on productive work. It may result in unavoidable poor unit cost for that work if it is allocated.

Another problem is that to identify whether unit costs should be stored in term of money or man-hours. If in terms of money, it is always a risky and approximate business. In terms of man-hours will be remain constant with the same conditions over the years. For the managers involved in controlling the costs money has more impact than man-hours in measuring the efficiency of an operation in progress when the data are collected.

The terms of money are usually for immediate use whereas the man-hours as the historical data and feedback for use in future estimating work. Nevertheless, it will rarely necessary for details of every single operation involved in a contract to be fed back to estimating department. The '80/20 rule' is often excerpt regarding to bill of quantities. It means that 80 per cent of the value of the work is often in 20 per cent of the items in the bill. Evidently, this 20 per cent hold an important consideration in tendering procedure and in subsequent cost control.

2.2.2 Reporting systems

'Weekly cost record' is one of the basic reports for the control of costs on site. It gives a full record of the quantities of work which have been carried out in the week previous to the date of the report, together with the lump sum total costs of the labor and plant that have been acquired regarding those operations, that is shown in Figure 2.2.

Each of the quantity, cost and unit cost are prepared on the basis of the work carried out during the week. There are four total areas are to be recorded; there are the total amounts of work carried out in this and previous weeks, the total work carried out to date, and an estimated total work that has to be carried out in order to complete the operation.

Table 2.2: Weekly cost record

ABC Contracting Ltd			Weekly Cost Record								Sheet 1 of 1			
Contract Power Station			Contract No H 1234								Week ending 23/12			
			Quantity				Cost (RM)				Unit Cost (RM)			
Code	Oper.	Unit	This	Prev.	Total	Est.	This	Prev.	Total	Est.	This	Prev.	Total	Est.
			week	total	to date	overall total	week	total	to date	overall total	week	total	to date	overall total

For the weekly cost record, only the major operations involving large quantities and significant cost would be prepared, because it involves a great deal of time and cost. In normal events, checking costs in less than one week would be too expensive an operation, unless the costs and quantities can be measured accurately and the operation on site is carried out at an extremely fast rate. Usually, the cost of materials used in a week would not be recorded.

In preparing the weekly cost record, the information provided should be as simple, brief and accurate as possible. The staff would only ignore the cost record sheets if there were too much impertinent information. The record should make a quick and lasting impression that would take consideration to the significant features of the condition.

The information in Figure 2.2 and the variations can be illustrated in graph forms. Graphs give a good indication of trends, with comparison of previous and present unit costs and indicate an action by the management in controlling costs is effective or not. Graph can indicate which specific action is taken and relate to it in the progress made in the reduction of costs.

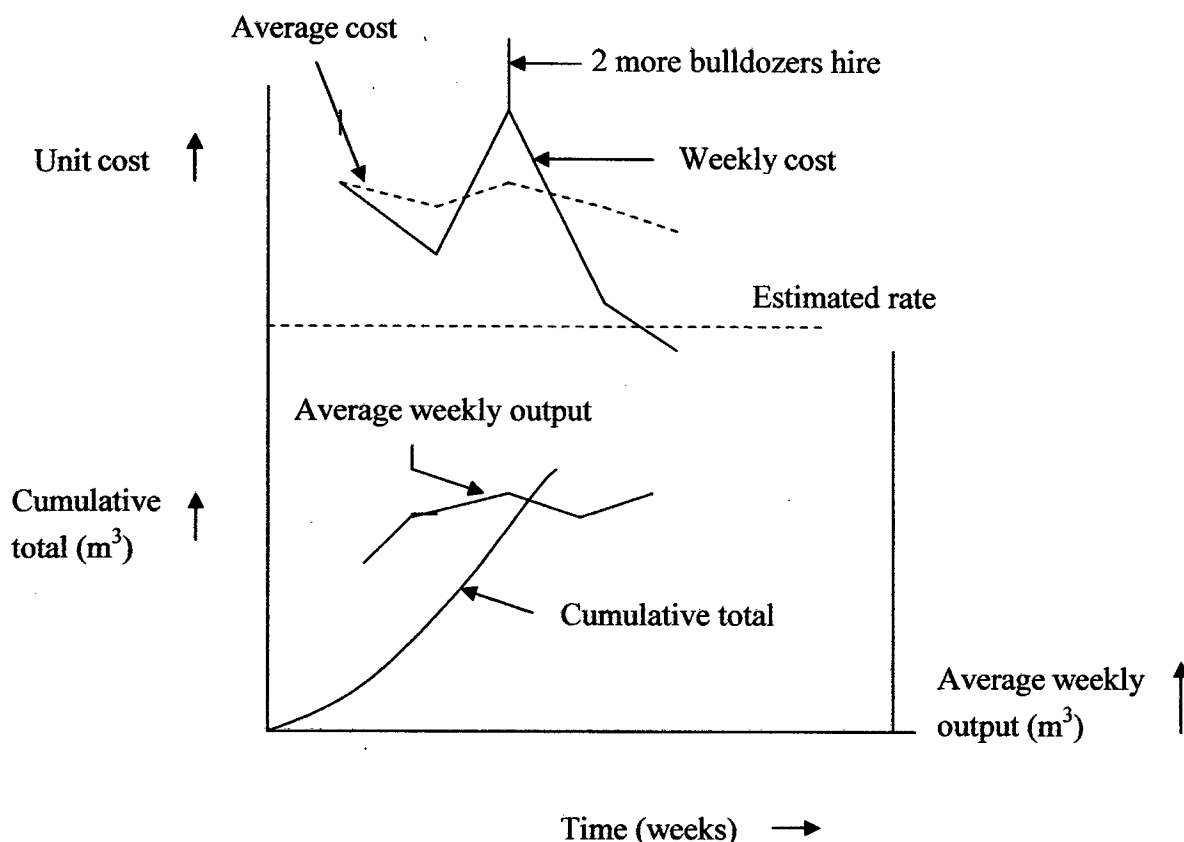


Figure 2.1 Graphical presentation of the information

The broken line in the upper graph indicated the trend of the unit cost per week, that is the average cost over the period to date. Cumulative total indicates the amount of work in the operation carried out at either in uniform rate or some variation. The average weekly output can be plotted in the same or different scale from the cumulative total output.

It is important to keep a graph of the number of operatives used on the work on each week, plotting on the same graph the cumulative total for the feedback for estimating for future works and controlling costs. The graph is used to compare with the one in the planning stage to see whether the number of operatives used on the contract is roughly the same as the originally thought. It is much easier to read than the tabulated figures such as in Figure 2.2. Trends are easier to mark and understand in graph.

There is no reporting system, in controlling costs will be effective if it is hard to read and understand for the person intended to. Charts and graphs in simple and easy to read aims for these objectives than tabulated figures.

2.3 Control of Materials and Mechanical Plants

2.3.1 Control of materials

Controls of materials are not highly considered in creating cost control systems. This is because that labor and plant are the areas that more variations exist, and most probably profit acquire or losses over the original estimated costs. Controls for materials should be in terms of unit measurement and not in terms of cost.

In cases of deficit, one cannot not be sure, if that the cost is basis, whether the materials bought at prices lower than estimate have a high wastage, or whether materials are used economically, with little wastage but bought in prices over the estimate. The cost comparison alone made for materials would only indicate no true quantity of the rate of usage for the materials.

One easy way in controlling materials is to draw a graph of the quantities of various materials that should have been used, which is calculated from present measurement of the quantities of work carried out. A graph like this would be drawn for major items only. Against this graph for each individual material can draw a second graph, indicates the quantities of materials that have been delivered to the site.

The information can get from the invoice received and a running total can easily be maintained. The intercept on vertical ordinate between two graphs should be equal in quantity of the materials on site. It is necessary to check the stock on the site to make the comparison effective, usually once a month. In large difference, it is necessary to check more often.

2.3.2 Standard Cost and Variance

To provide useful analyses of cost data that has collected, there must be a 'standard' available. Estimating possible outcome from historic performance and experience usually sets standards in construction or in special cases from the use of work measurement techniques.

From estimated costs the initial budget can be ascertain and the variances between actual and estimated is calculated. The variance is negative or unfavorable if the actual cost is greater than the standard and in reverse situation the variance is favorable.

Variance can occur in two reasons:

- a) the actual price paid for resources is greater or less than estimated in the standard.
- b) the actual quantity of resource used is greater or less than estimated in the standard.

The two factors deserve consideration if the work is to be carried out at its budgeted cost. Inefficiencies are important in terms of cost, and attention can be paid on limited areas where these inefficiencies exist when using the variance analysis. It also differentiates between variance that occur because of price differences and quantity differences.

$$\text{Actual cost (AC)} = \text{actual quantity (AQ) x actual price (AP)}$$

$$\text{Standard cost (SC)} = \text{standard quantity (SQ) x standard price (SP)}$$

$$\begin{aligned} \text{Total cost variance} &= \text{standard cost (SC)} - \text{actual cost (AC)} \\ &= (\text{SQ} \times \text{SP}) - (\text{AQ} \times \text{AP}) \end{aligned}$$

Variance analysis will first of all be applied to the purchase and use of materials. There will usually be either a 'material price variance' or 'material usage variance'. The material price variance will amount to the difference between the standard and actual prices for the quantity of materials used whereas the material usage variance will be the difference between the standard and actual quantities of materials used.

$$\text{Material price variance} = \text{AQ (SP- AP)}$$

$$\text{Material usage variance} = \text{SP (SQ-AQ)}$$

$$\begin{aligned} \text{Material cost variance} &= \text{SC- AC} \\ &= (\text{SQ x SP}) - (\text{AQ x AP}) \end{aligned}$$

2.3.3 Labor Variances

There are two variances in labor costs. There are 'labor rate' and 'labor efficiency' variances. The labor rate variance occurs from the difference between the standard wage rate and the actual wage rate paid.

$$\begin{aligned} \text{Labor rate variance} &= \text{actual time worked (standard-actual rate)} \\ &= \text{AH (SR-AR)} \end{aligned}$$

The labor efficiency variance occurs from the difference between the actual time and the standard time to do a job, which is measured at the standard rate.

$$\begin{aligned} \text{Efficiency variance} &= \text{standard rate (standard time - actual time)} \\ &= \text{SR (SH-AH)} \end{aligned}$$