



A CRITICAL LITERATURE REVIEW ON IMPROVING PROJECT COST MANAGEMENT PRACTICE AND PROFITABILITY OF DOMESTIC CONTRACTORS

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Abstract:

Construction cost management is the most important function for project success, and the construction project performance is generally expressed in terms of cost and its variance from the budget. However, it has not been effectively used due to the presence of a large quantity of data with many complex interrelationships. Construction firms, being project based organizations, have to develop their project management capacity in order to accomplish firm and project objectives successfully. Hence contractors need to focus on project cost management process. The study presents the limitations, drawbacks and shortcomings of each project cost management functions related to current practices of domestic contractors, which need to be improved for achieving the predefined project objectives and the profitability of contractors along with the proposed improvement recommendations, through critical literature review.

Keywords: *Project Cost Management; Tendering; Cost Estimating; Cost Budgeting; Cost Control.*

Cite This Article: AmanuelGirmaYismalet, and Dixit Patel. (2018). "A CRITICAL LITERATURE REVIEW ON IMPROVING PROJECT COST MANAGEMENT PRACTICE AND PROFITABILITY OF DOMESTIC CONTRACTORS." *International Journal of Engineering Technologies and Management Research*, 5(1), 51-58. DOI: 10.5281/zenodo.1164074.

1. Introduction

Construction firms are the key stake-holders of the construction industry and they are the primary agents for meeting the demands of the industry. They carry out the construction of public or private projects, which demand efficient management and coordination to make the best use of resources and ensure continuity of works and revenues. These firms mostly depend on the outcomes of the contracted projects for their survival, growth and generating adequate amount of profit. Thus, contractors need to focus on various project portfolio management processes to fulfill the predetermined project objectives, from which project cost management process is the one and most essential and common issue in the entire construction industry.

However, construction cost management has become more complicated with the introduction of new procurement methods, technologies, resources and various professionals involved in a project, Pereira and Imriyas (2010). Most domestic contactors are characterized by lack of appropriate financial management system; and failure to manage these projects will lead them to insolvency that weakens their organizational capacity. It is recognized that the number of failures of contractors in the construction industry is much higher than it should be. As study shows, the high business failure rate is not because contractors do not know the techniques of construction, but rather they have not developed the necessary management skills.

According to PMBOOK guidelines (2013), project cost management is predominantly concerned with the cost of the resources required to complete scheduled project activities during the execution stage, and this includes cost of using in tendering, construction, maintaining and supporting results of the project.

Abeselom (2008) stated that, construction projects cost management is a process which complements the broad functions of estimating and tendering, scheduling, cost control and financial control. Accordingly, contractors need to have a cost management system which spans from the tendering up to the completion stage which integrates estimating, tendering, budgeting and controlling. Construction cost management is the entire process, which ensures that the contract amount is within the cost limit of client's approved budget, Karim Eldash (2012).

The cost performance of the project highly depends on cost variances, which is referred as any deviations in the budget or cost planned. The benchmark for estimating the cost variance is derived from the comprehensive planning stage where design, specification, scope and final cost are developed or from the award of contract, which is the final negotiated and agreed price at the construction commencement.

2. Review of Literatures

Construction works are time bound activities which involve heavy investments of capital and resources and hence project cost and its control are important management responsibilities. The significance of efficient cost management of construction projects are widely recognized by construction professionals in practice. Despite the wide application of cost management and control techniques, cost deviation problems are still quite common in construction projects.

Construction project cost management incorporates a set of project objectives which may be accomplished by implementing a series of operations subject to resource restraints. It is a challenging task in practice and there may have potential conflicts between the specified objectives with regard to time, cost, scope and quality, and the constraints imposed on all of the physical resources demanded. A project manager should require knowledge and attention that focuses on different areas, from which project cost management is the one to identify required resources and keep budget control, Chris Hendrickson (2008).

As Abeselom (2008) noted, contractors, on receipt of work tender, prepare cost estimates and based on the estimates, they quote the estimated price of the works and then agrees for executing the work followed by drawing up their plan of work based on the quantities and costs reflected in

the bill of quantities (BOQ) which forecasts the contractors' commitment for resources, input costs and the profits which they expect. Once construction commences, contractors attempt to accomplish the work in a way that keep the cost of carrying out the work, with in the money that will be reimbursed to them as a result of valuation of completed works. These processes comprise the tasks which most contractors are involved and which need systematic approach.

Estimation of construction cost involves identification quantification and valuation of the various direct and indirect cost components. The budget which is prepared based on these cost components will be the baseline for the cost controlling process. Accordingly, contractors' cost management system should consider and integrate these tasks. The total construction cost of a project is composed of four cost categories; direct costs which can be correlated to specific activity, indirect costs which cannot be correlated directly to the physical activity, risk allowances which is incorporated to take care of possible risks and contractors' profit.

According to PMBOOK guidelines (2013), planning, estimating, budgeting, financing, managing and controlling costs, and interaction of each other to complete within the approved budget, are the sub processes which involved in the project cost management process. Also, Pereira and Imriyas (2010) stated that, construction cost management deals with a broad range of functions such as estimating, scheduling, cost control, resource costing and financial control. Based on these functions, Perera and Imriyas have developed an integrated project cost management scheme. The sub systems and the interactions between them in the integrated system are shown in the Figure below.

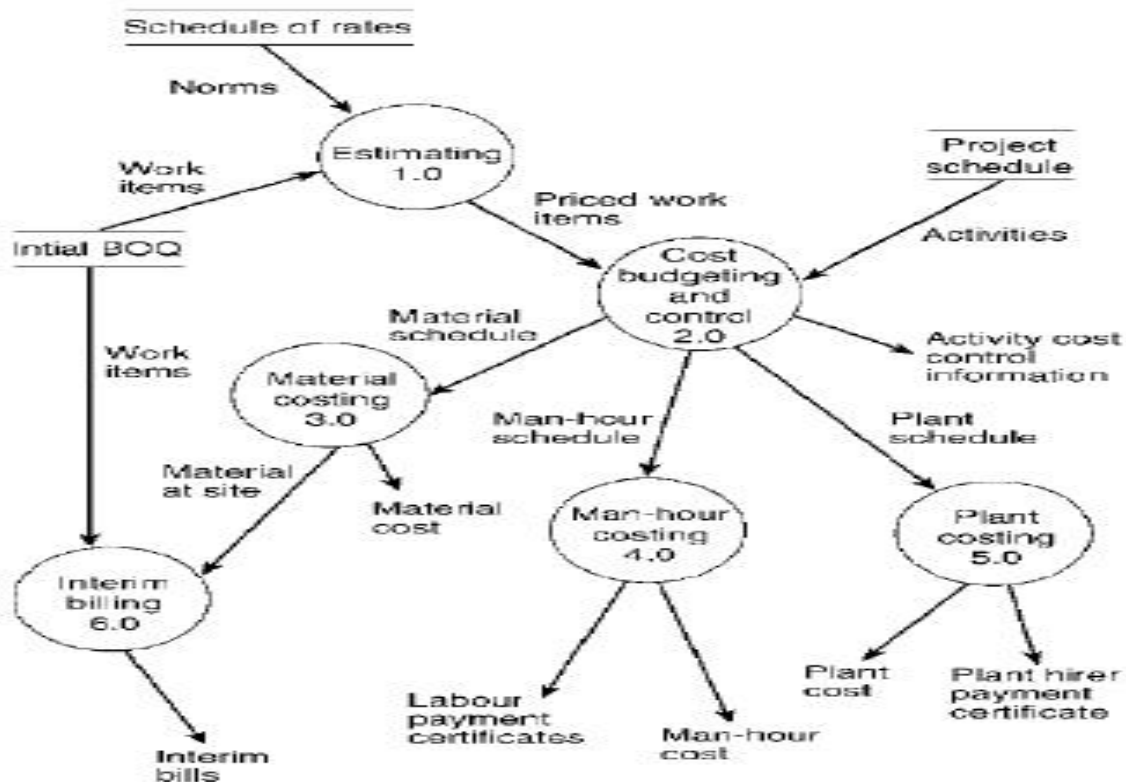


Figure 1: Data flow diagram for a cost management system, Pereira and Imriyas, (2010).

According to Cindrela and Ananthanarayanan (2017), too many complexities in construction projects does not allow to manage the probable costs of projects. Cost overrun is a major issue in project performance and the most significant cause of cost deviations include scope creep, construction delays, rework and practise of awarding the contract to the lowest bidder, incomplete design and specifications, design errors, changes in scope, change orders, delay in design delivery, contractual claims, disputes at site and poor project management, price fluctuations, increase in wages and material prices, poor coordination at site, and poor communication. To get the true costs of the project and to have control over the cost variances, better understanding is required on its pervasiveness of inaccuracy and risk in decision-making.

Bad weather conditions, low resources output, overlapping of activities, sickness of labourers, shortage of materials, work delays instructed by clients, delayed payments by clients, changes by clients, rework, ambiguous drawing details, and delay by local authority to inspect work and give a go-ahead are the major problems reported by the contractors that leads to failure to complete within budget. The stated cost control a technique has not been effectively used as documents to prove the applications, and has found lacking or not there at all, Otim, Nakacwa, and Kyakula. Thus, the problem of cost control is actually the lack of knowledge and insufficient planning for the implementation coupled with the poor management of construction resources.

The challenge in the non-infrastructure construction project is sourcing of funds, cash-flow management, and completion of project on time. The performance of project is directly related to the cash-flow of the project, which in turn looped to the payment to the contractors that affects the construction progress. Plither (1992) has mentioned the importance of estimating, budgeting and controlling for the effective performance of contractors with regard to cost (Cited by Abeselom, 2008).

Jha (2017), on the other hand discussed that the construction project cost management can be taken up in four broad steps; resource planning schedules, cost planning, cost budgeting, and cost control. As most construction companies use cost as a standard in calculating the rate of progress of a project, and a project is managed based on the actual cost, cost management has become very important in the construction industry. Thus, cost management at the construction site is linked to the cost management system at the main office, and is managed by personnel at the main office.

3. Construction Project Cost Management Functions

Construction project cost is decided through a series of steps. In the estimation stage, the estimated cost is tendered and the successful contract is awarded with a proposed price. As described by the different authors an integrated project cost management involves the tasks of estimating and tendering, budgeting or the dissemination of estimated costs and expected incomes, and controlling costs by comparing actual costs with the estimated costs.

Cost estimating and cost control applications are still not satisfactorily used. The present training effort should be tailored to improve the abilities of contractors focused on using analogous and parametric estimate, cost alterations and earned value.

The project cost estimate is mainly concerned with the cost of resources required to complete the planned project activities, and it is the most important aspects of construction management process which is used to forecast the cost of undertaking a construction work. While tendering is a process where by a contractor given the cost estimates, converts this to the sum what will actually be submitted to the client. If the invitation to tender is given by client and accepted by the contractor, the contractor offer estimates to carry out the work and then the tendering process begins. The first decision to be made by contractors when invited to submit tender is whether a bid will be submitted or not. If a contractor decides to bid, he has to decide on the bid price also.

In a competitive bidding environment contractors' desire is to submit a bid at the low price to win the award with comfortable margin for profit. The most popular tools which have been accepted in cost estimating and control are analogous analysis, detailed estimating, parametric estimating, best guess estimating, Variances, Cash flow/S-curve, and Earned Value, Nabil El Sawalhi (2004). The accuracy of a cost estimate depends on the time and funds deployed, despite numerous types of estimates.

Now-a-days, the most widely used civil construction contracts pricing strategy to compete the bid is the BOQ/ad measurement contract types, where unit prices are quoted for each activity listed in the BOQ, whose quantity is placed aside. The tender amount comprises a cost estimate for project activities and mark-up allowance for general overhead and profit. Along with, market-based pricing is a promising solution rather than cost-based pricing, that can overcome the challenges in marketing construction services in the future and that can maximize the benefits derived by all the parties involved in construction projects, found by Serpong, Tangerang (2003). Also Sahay and Subhashish suggested that the firms having Activity Based Costing system have better awareness for benchmarking and budgeting, but they lack in priority of budget goals.

Poorly performed budget plans can result difficulties to use the allocated funds. Most of the contractors prepare budget for their projects, but only few use the budget for facilitating the cost controlling process. The primary purpose of a budget is forming baseline against which actual expenses and performances are compared. Based on the baseline, cost controlling system should be capable of tracking and identifying activities which indicate substantial deviation from planned amounts.

Contractors' cost controlling scheme gives much attention to the material cost component. The material cost component should get more attention owing to its high proportion and sensitivity to price changes. But, labor and equipment costs being the components where inefficiency is encountered most of the time, the system should focus more on these items. In cost controlling practices, an efficient project cost control system is one which generates information that can improve the productivity of resources, track and identify activities that suffer inefficiency and which provides feedback to subsequent estimating, apart from indicating profitability only. By many of the contractors, the cost controlling is not linked with the cost estimation process and fails to provide feedback for the valuation or pricing of subsequent bids. Among the major purposes of a cost controlling system one is providing feedback to the estimation process. This is facilitated by establishing a database or cost records which retains actual production costs and productivity standards.

According to Shanmuganathan and Baskar (2016), cost management techniques like cost flow forecasting, cost planning & control and estimate having highest relative importance is the important one to control the cost. Also, as Otim, Nakacwa, and Kyakula discussed, the most common cost controlling techniques used by contractors are schedules, budget, work inspections, site meetings, cost reports, monitoring of cost, and performance evaluation, while others did not have well defined control techniques. Besides, earned value management is a comprehensive and effective technique for cost control. The earned value model as a project control technique, can evaluate work progress by identifying the potential delays and cost overruns in a project, and it provides a quantitative measure of cost information, which is very useful for controlling projects as stated by Sangyoub and Sangchul (2008). Contractors should prepare S-curve and earned value from experience of previous similar operations in their company as a means of control and progress measurement.

Mainly affecting the factor on cost of project is delay in project and material and the several methods that have been developed and applied to analyse the time-cost problems can optimize only one parameter, Anuja and Parag (2015). Inaccurate estimation of project time/duration; design changes, risks and uncertainties; complexity of works and; poor performance of subcontractors are the top hindering factors of time and cost control in construction practice, Olawale, Y., and Sun M. (2010).

Thus, to improve the existing cost management practice, contractors should follow a detailed examination of all the factors related to submit tender offer; they need to have a bidding strategy which is directed towards the acquisition of sufficient volume of business at a sufficient profit level; they are advised to maintain records of actual data on material consumptions and resources' productivity; overhead costs need to be identified, quantified and estimated item by item during the cost estimating stage; all potential risks, economic conditions, and political situations should be assessed, forecasted, quantified and incorporated in to the tender sum to the extent possible. Also, they are recommended to use other estimating techniques in addition to the standard estimating technique; cost estimating formats should be integrated with those used for budgeting and cost controlling purposes; their cost controlling system should be able to identify activities which are being carried out uneconomically and indicate the causes; they must be accustomed to the preparation of a budget for each activity; and it is highly recommended that contractors should use project works breakdown for facilitating the cost management and controlling process.

4. Conclusion

As projects cost management system complements the broad functions of cost estimating & tendering, planning & scheduling/ budgeting, and cost and financial control; contractors need to have a cost management system which integrates estimating, tendering, budgeting and controlling.

The major shortcomings of construction projects cost management practice can be broadly attributed to ineffective approaches to identifying, managing and controlling client needs, project scope and project cost, incompetent competition in tendering, delay in project and material, rework, the changes in design and specifications, changes in scope, design errors, incomplete

design, delay in design delivery, contractual claims, disputes at site and poor project management, price fluctuations, inflation, increase in wages and material prices, poor coordination at site, and poor communication. Besides, it has been revealed that the problem is actually not only in the techniques to use but rather the lack of knowledge of the techniques, the poor management of the cost control methods, and poor site organisation and inadequate supervision. Thus, contractors should give adequate and balanced consideration to the cost management functions.

An integrated project cost management system could be developed by using proper procurement strategy, various low cost material, mathematical method and software based models, and well defined cost control techniques. If costs are not estimated accurately during the tendering stage, no matter how efficient the cost control is, projects will not satisfactory performed with regard to profit. Also, if costs are not properly budgeted and controlled/monitored during the construction stage, however accurate the estimates are the financial outcome can be disastrous to the contractors. Better understanding is required on its pervasiveness of inaccuracy and risk in decision-making to get an ideal cost of the project and to have control over the cost deviations.

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