



An Evaluation of Cost Control Techniques in Nigerian Construction Industry

Opatunji Oladele Ayinde

School of Environmental Studies, Department of Quantity Surveying

The Federal Polytechnic, Ede, Osun State, Nigeria

davidopatunji@yahoo.com, 08034649021

Abstract – Cost control is one of the most important management tools in the construction industry. Project success depends on how it can achieve project objectives, which is to complete the project within the estimated budget to the required specification within the pre-determined duration. Despite the availability of various cost control techniques software, many construction projects still do not achieve their cost objective. To solve this problem, good practice of cost control techniques are essential. A structured questionnaire was administered among Quantity Surveyors in Oyo State Nigeria. The respondents were asked to give rating on a 5 point Likert scale on the cost control techniques currently being used by contractors and the challenges of usage. The result of the study indicated five commonly used cost control techniques which include valuation, material management, record keeping, site meetings and work programme. The study was able to establish that material wastage on site availability of equipment and completion period are some of the challenges facing the usage of cost control techniques. The findings of the study have considerable implications on the practice of construction.

Keywords: Cost Control, Construction Industry, Construction Practitioners, Construction Project, Quantity Surveyors

1.0 Introduction

In construction almost all clients are interested in obtaining gully functional facilities completed in time, cost, quality and scope. A builder who is able to construct within the estimated time and budget, to the right standards and scope is an excellent builder. Cost control is a process where the construction cost of the project is managed through the best methods and techniques so that the contractor does not suffer losses when carrying out the activities of the project. One of the aims of cost control according to George et. al (2012), is to construct at the cheapest possible costs consistent with the project objectives. Ultimately the decision of the manager that something should be done differently and the translation of that decision into practice are the actions to achieve control (Harris and McCaffer, 2002). Raina (1999) observes that it is of little use after a process has been completed to discover that its cost was actually too much. Most project managers and contractors in Nigeria find difficulty in controlling costs on their construction sites due to a number of problems which include poor project preparation, lapse in management and control, over budgeting, poor materials, labour shortages, increased cost of materials, delays in deliveries, wastage of materials, unexpected weather changes, loss of materials, insecurity and poor communication. This results into cost and time overruns, conflicts, and sometimes abandoning projects. This study was therefore carried out to identify the cost control techniques used in Ibadan, Oyo State and recommended to stakeholders who do not follow proper monitoring programs and cost controlling techniques.

2.0 Literature Review

2.1 Cost Control

Ayodele (2005) defined cost control as all methods of controlling the cost of building and civil Engineering projects within the limits of a predetermined sum throughout the design and construction stages.

The control of project cost is not an easy task and it requires knowledge of applying cost controlling techniques. According to George (2012), the procedures for project control and record keeping during the execution of a project is highly essential for construction industry practitioners. Cost control can be achieved by choosing the appropriate professional, equipment and tools for the work, (Dha Wadker, 2012).

It is expedient for practitioners especially project managers to be well equipped to execute the project, with due consideration to the quality of work, yet within the limits of a pre-determined sum.

2.2 Pre-Contract and Post Contract Cost Control

2.2.1 Pre-Contract Stage

In the Management of cost, there are three processes involved; cost estimating, cost budgeting and cost controlling (Owens, 2007).

Table 1: Cost Management Element

ELEMENT	DESCRIPTION
Cost Estimating	Developing estimates and measurement for the cost needed for a resource to complete project tasks and activities
Cost Budgeting	Collecting the cost estimates, combining them to develop and overall cost and baseline
Cost Controlling	Managing and controlling factors that change or affect the budget

Having accurate project estimates and budget is essential to deliver the project within the project budget. This is referred to as project planning (Sharma & Rupen, 2013).

2.2.2 Post Contract Cost Control

The Quantity Surveyor cost control function does not end at the pre-contract (tender stage) but continue throughout the execution of the contract. The Quantity Surveyor under the standard form of contract has no authority to issue instruction that would affect the project. What he does in practice is to operate a budgetary control system which can provide the information that will enable others to control the cost.

Ashworth and Hogg (2002) advised contractor to ensure that construction project could be accomplished within the pre-determined sum after they have successfully won the contract.

This will involve project resource planning and controls especially during construction. Resources inputs at the project site which produce outputs in the form of work includes; Men, Materials, Machinery and Money. The success of a project depends on the performance of these input resources when controlling costs (Hendrickson, 2008). The clients should do everything possible to avoid unnecessary delays as it is one of the leading causes of cost escalation.

Materials

One of the big problems on most building sites is the large amount of materials wastage due to varying circumstances. This problem requires a supervisor to constantly be on the lookout for the losses. According to Hendrickson (2008), wastage of materials can take place during the procurement process, storage, and during utilisation. Wastage during procurement can result from one or more of the following

causes: buying materials of wrong specifications, buying more than the actual requirements to cater for unrealistic and unforeseen eventualities, untimely buying of short-life materials, improper and unnecessary handling of materials, and wastage in transportation. Wastage during storage can occur due to the following reasons: damages and breakages during handling, deterioration due to incorrect storage, incorrect maintenance and short-shelf life and losses due to fire, thefts vandalism, and exposure to extreme climatic conditions. Other causes are lack of pre-work preparation and coordination, improper accounting and poor storekeeping, negligent and careless attitude of the supervisor, high rate of deterioration due to long storage at the place of work, and over-issues from the central stores and failures to return unused surplus materials to the stores. According to Chitkara (2005), some unavoidable wastage are inherent during utilisation, but excessive wastage is of concern to the management as it affects the productivity adversely, with consequences of extra costs. Most problems relating to material wastage revolve around requisitioning and ordering, receipt and checking of deliveries from suppliers, offloading and handling, storing and protecting, and issuing, distributing and use of material.

Plant

In construction, some tasks are labour intensive, some predominantly employ equipment and some use a combination of both. While the actual work done and the associated labour is accounted by the supervisor concerned, the equipment and productivity control is undertaken to determine its employment time, the output achieved, and its productivity at site (Hendrickson, 2008). The main purpose of the control is to minimize wastage in utilization so that the overall project cost affected (Chitkara, 2005). Alinaitwe (2006) observed that industrializing construction would probably reduce the cost of construction by about 30% which would likely settle the back log of 25% in country without proper housing.

Labour

Labour productivity achieved at the site for a given work provides a measure of the labourer's efficiency and efficiently and the level of site organization. It shows the total time for which the labourer was employed at work, the time he was productive on work and the time he remained unproductive (Chitkara 2005). Craftsmen use about 40% of available time on productive activities, and about 55% of the time on non-value adding activities (Alinaitwe 2006). Productive times are wasted for various reasons such as idle waiting, unnecessary travelling, late starting, early quitting, unscheduled breaks, and delays in the receipt of tolls, delays to receive materials and work instructions. Assessment of the level of industrialization and the effect on productivity and other metrics were done by Alinaitwe, (2006) and the results indicated that the cost of labour is of the order of 30 to 40% of project costs. The metrics confirmed that labour is a significant feeler in the cost of buildings and more efforts are required to industrialize the industry. According to Chitkara, (2005) cost control process involves accounting of actual productivity, and comparing with the standard, analyzing the causes for variations taking remedial measures for improvement. Raina (1999) emphasizes the need for close supervision and good working relationship.

Time-Cost Relationship

Chitkara (2005) said the relationship between time and cost is a very important aspect in the control of costs on site as any variation in time has automatic implication on cost. It is important to report and record all the works involving materials, plant and labour on sites. This enables the contractor be able to know the costs and expenses of the resources used on site and compare with the initial cost budget. Various report techniques used include: daily or weekly and monthly recording, schedule control, site daily diary report and the project budget.

3.0 Analysis and Presentation

The data collected from the survey was analyzed using Microsoft office excel and 'relative indices' (R1) techniques. Presentation was in the form of graphs, bar charts, and tables. The R1 technique was used by Holt et al. (1996) in the same context of application using the formula:

$$RI = \frac{\sum (1n_1+2n_2+3n_3+4n_4+5n_5)}{5[n_1+n_2+n_3+n_4+n_5]} \quad 13$$

Where n_x = the number of respondent agreeing with the x choice. This formula is also used in relation with the Likert scale. The computation of RI using this formulae yield the value of RI ranging from point five to one

4.0 Result and Findings

The study focused on Quantity Surveyors who are either engaged as consultants, contractors or in a client organization. The reason for this choice is simply that they are the immediate victim of the consequences of failed cost control system. A total of 150 Questionnaires were distributed using purposive sampling method, 114 responses were found to be adequately useful for the study representing a response rate of 76%. This is adequate enough considering Moser’s and Kalton’s assertion that the result of a survey would be considered as biased and of little value if the rate of return were lower than 30 – 40%

Table 2: Background Information of Respondents

Years of working experience of Respondents	0-5	17.35
	6-10	34.37
	11-15	21.50
	16-20	11.30
	21-25	8.51
	Above 25	6.97
Number of Projects Handled by Respondents	0-5	10.35
	6-10	28.50
	11-15	13.55
	16-20	15.32
	21-25	19.28
	Above 25	13.00

Table 2 shows the background information of the respondents who participated in the survey. It was observed that 36.84%, 32.46% and 30.70% of the respondents were trained Quantity Surveyors working with consultants, contractors and client organizations. Considering respondents years of working experience, 34.70% have over 10 years of working experience, 21.50% of the respondents have above 15years working experience, 6.87% have above 25 years working experience in their respective firms while 17.35% have 5 and less years of working experience in the respective firms. Table 1 also indicates that 10.35% have handled less than five projects, 28.50% have handled over six projects and 15.32% have handled over 20 projects. The result implies that the respondents have good working experiences and are suitable for this type of research which makes the data reliable.

4.1 Cost Control Techniques employed by practitioners

Sixteen cost control techniques were examined. Table 3 illustrates the degree of usage of which different techniques were used by construction industry practitioners to control cost.

Table 4 shows that Valuation of work (11.40%), Record Keeping (8.77%), material management on site, (8.77%) site meetings (9.52) and work programmes (7.89%) in progress are the most frequently used cost control techniques by construction practitioners with work programmes. The most effective cost control technique is valuation of work in progress with a RII of 0.58 (11.40%) and the least important is elemental analysis with R.I 0.75 (2.63%). Quantification of works and comparing with the costs in the bills of Quantities helps to ascertain that the progress of work is on the right track. Eleven (9.65%)

construction practitioners (mainly Quantity Surveyors) from consultants, clients and contracting firm) said site meetings help to review the progress of work in comparison to the monetary allocations.

Table 3: Cost Control Techniques Used among construction Practitioners

	CONSULTANTS				CLIENTS				CONTRACTING			
	F	Ts	%	M	F	Ts	%	M	F	Ts	%	M
Performance reviews and variance analysis	2	10	4.76		3	5	8.11		1	2	2.86	
Budgetary control	3	5	7.14		3	5	8.11		3	5	8.57	
Cash flow analysis	3	5	7.14		1	2	2.70		2	10	5.71	
Earned value management	1	2	2.38		1	2	2.70		3	5	8.57	
Cost reduction on site	2	4	4.76		1	2	2.70		2	10	5.71	
Material management	5	10	11.90		2	10	5.41		3	5	8.57	
Cost optimization techniques	1	2	2.38		1	2	2.70		2	10	5.71	
Elemental analysis	1	2	2.38		1	2	2.70		1	2	2.86	
Whole life costing	1	2	2.28		1	2	2.70		1	2	2.86	
Risk analysis	2	4	4.76		1	2	2.70		2	10	2.86	
Facilities management	1	2	2.38		2	10	5.41		1	2	2.86	
Cost planning	3	5	7.14		3	5	8.11		2	10	5.71	
Site meetings	4	6	9.52		5	10	13.51		2	10	5.71	
Work programmes	3	5	7.15		3	5	8.11		3	5	8.57	
Record keeping	2	5	4.76		4	6	10.81		4	6	11.43	
Valuation of work in progress	5	10	11.90		5	10	13.51		3	5	8.57	
Other cost use at all	-	-	-		-	-	-		-	-	-	
Total	42	84	100	2.00	37	80	100	2.16	35	104	100	2.97

Key : F = Frequency, TS = Total Score, % = Percentage; M = Mean

Table 4: Cost Control Techniques in Percentage

Cost Control Techniques	Frequency	Percentage
Performance reviews and variance analysis	6	5.26
Budgetary control	9	7.89
Cash flow analysis	6	5.26
Earned value management	8	7.02
Cost reduction on site	5	4.39
Material management	10	8.77
Elemental analysis	3	2.63
Whole life costing	4	3.51
Risk analysis	4	3.51
Facilities management	4	3.51
Cost planning	8	7.02
Site meetings	11	9.65
Work programmes	9	7.89
Record keeping	10	8.77
Valuation of work in progress	13	11.4
Cost optimization techniques	4	3.51
Total	114	97.99

Table 5: Factors Influencing the Usage of Cost Control Techniques

	Consultant		Client		Contracting	
	RII	RANK	RII	RANK	RII	RANK
Location and Condition of site	0.85	4	0.86	4	0.79	4
Planning Procedure	0.84	6	0.82	6	0.76	5
Expertise	0.79	9	0.81	7	0.73	6
Fluctuation in Materials	0.85	4	0.84	5	0.72	7
Plants and Labour	0.88	8	0.80	8	0.70	8
Lowest responsive bidder policy	0.83	7	0.79	9	0.68	9
Material wastage on sites	0.98	1	0.91	1	0.85	1
Availability of funds	0.90	2	0.89	2	0.83	2
Completion period of project	0.89	3	0.87	3	0.80	3

As shown in Table 5, all the construction industry practitioners agreed that material wastage on site, availability of fund and completion period are the three most important factors that influence the choice of cost control techniques by ranking them 1st, 2nd and 3rd respectively. The result (table 5) equally show that all the respondents ranked the lowest responsive bid policy as the least factor that influence the usage of cost control techniques. From the first three factors influencing the usage of cost control techniques among construction practitioners with an overall relative important index (RII) of 0.98, 0.90 and 0.89 (consultants), 0.91, 0.89 and 0.87 (clients) and 0.85, 0.83 and 0.80 (contracting firms) respectively. Closely following is the location and condition of site with RII of 0.85, 0.86 and 0.79 respectively.

The implication from the findings is that all the factors assessed moderately influence the type of cost control techniques to be employed by practitioners, but some factors like material wastage on site, fund availability and completion period highly influence the usage of cost control techniques.

5.0 Conclusion

The result showed that effective cost control procedures, practices and approaches are seriously lacking. Practitioners are more comfortable with the conventional method of cost control with limited involvement in information technology. Almost all the practitioners surveyed do not utilize any form of computer software for cost control. Those who use computers, utilized Microsoft excel, Microsoft project and primavera.

The issues of material wastage on site were found to be the aftermath of engagement of incompetent supervisors with little or no experience in project management. Most of the practitioners especially the contractors do not have major equipment of their own. They obtained equipment through hiring especially when it involved mechanized construction

Practitioners also observed that delayed payments from clients, delay response to instructions, bad weather, unclear details on the drawings are factors that causes delay and eventually led to cost overrun of the project.

6.0 Recommendations

The focal point of this study was to assess the cost control techniques used by construction industry practitioners and the contribution of the factors to the success rate of the project. The survey discovered that the challenged faced by practitioners was the improper management of cost control techniques and not the techniques itself.

The study therefore recommends that practitioners should constantly attend workshop and seminars on construction project management. This will refresh and broaden the required knowledge for controlling cost of their project

A new classification of cost control practices and strategies by construction practitioners have been formulated based on the literature current and past which can identify the level of commitment practitioners have towards controlling their project costs.

The cost manager (i.e. the quantity surveyor trained specifically for the purpose) should also exhibit the foresight in predicting and arresting those where not constraints that are associated with building projects which may either retard the progress of work or extend the pre-determined project duration.

References

- Alinaitive, H.M Assessing the Degree of Industrialization In Construction. A Case study of Uganda. *Journal of Civil Engineering and Management*, 2006:12(3):16-18.
- Anuranjan, K, Prakash, N., and Avamish, M. Cost Control Construction Planning on site. *International journal of Science, Engineering and Technology*. 2015;pp 295-302
- Ayodele, E.O., and Alabi, M.O.. Effects of Cost Control on Building Projects Delivery in Nigeria. *Journal of Civil and Environmental Research*,2014;30-34;2225-0514
- Ashworth, A and Hogg, k,. *Practice and Procedure for the Quantity Surveyors* (3rd ed.). oxford:Blackwell, 2002,p.102
- Chitkara, K., *Construction project management: Planning, Scheduling and controlling*.3rd ed.Canada: Tata McGraw hill, 2005,p.180-185
- Dharwadker, p., .*Construction Management*, 2nd ed.Oxford &IBH Publishing co. PVT ltd., New Delhi, ibh, 1996, p. 206-208
- George, S .*Construction Materials Management* 1st ed.Newyork: Amazon, 2012,p.36-40
- Harris, F and Mccaffer, R. *Modern Construction Management* 2nded London: Granada, 2002, P:118-1120
- Hendrickson, P. *Project Management for Construction* 3rd ed. Carnegie: Granda, 2008-p.115
- Holt, G.D. Proverbs, D.G., and LOVE, P.E.D.”Logistics of Materials Handling Methods in High rise in-site Construction”. *International Journal of Physical Distribution of logistics management*, 1999:10, P. 659-675.
- Owens, J. *Project Cost Control Tools and Techniques* 2nd ed. Newyork: Amazon, 2007, P 16-18
- Raina, V.K. *Construction Management Practice*. 7th ed. New Delhi: Tata Mcgraw-Hill 1999, p. 12-14