

Project Cost Control in the Nigerian Construction Industry

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ABSTRACT: *The construction industry being solely responsible for economic growth of the nation will base on the government's fiscal policy and budget the formulation of its own policy plan on how to carry out development within that budget and equally give the nation a healthy developed environment. Besides, the overall aim of cost control and management is to make sure that scarce resources are utilized to the optimum benefits of the main parties to a construction contract. That means that design and execution of a project should produce maximum value for money. Given therefore, the high cost rate of money for construction resources and high interest in this dwindling, deregulated and depressed economy, it is pertinent that efficient costing should be a very strong element in project design and implementation.*

The economic aspects of construction are complicated by the fact that the functions of design and production are generally separated. At the design stage, the designer will usually not know the methods and equipment available to the contractor who may ultimately build the project, and who is directly responsible for the materials used, which for most buildings account for about two-thirds of the total cost of the project. This is not to suggest that the contractor has no contribution to make, but since the labour which he controls, cost only about half that of the materials, his efforts can easily be nullified by any design which makes excessive or unnecessary use of materials. This will have serious adverse effect on the project cost, its execution and completion date and may lead to delay and outright abandonment.

The need to have cost data available from the earliest stages of the design has encouraged the development of methods of "cost planning" and the wider application of such techniques if cost is to become as it should be, an integral part of design. All these should be geared towards effective cost management and control as a solution to project abandonment.

Management is a leading factor in any investment. Prosperity breeds mismanagement. Paradoxically, management is the single factor which forces an upturn in a recession. Management is the single factor which separates prosperity and recession. It is the resources well managed or mismanaged today that makes for tomorrow's prosperity or depression. The economic depression we are now facing is more out of mismanagement of resources than lack of resources. The key to the success of our construction investment industry is professional management. There is urgent need for innovations in the cost management of our construction resources for viable products. The vital question however is whether the Project Manager being the construction cost planner is economizing enough the variables that affect the cost of construction which are supposed to be under his control in order to bring down cost of construction to a tolerable level. This is the main focus of the study to unveil the management philosophy, practice and inputs to be affixed in evaluating and monitoring construction cost in order to reduce project abortion and abandonment, which are caused by project cost overruns.

Key Words: *Project Cost, Cost control, Construction Industry, Project abandonment, Cost over-run, Time over-run, Project delay, Project Management.*

I. THE PROBLEM

In Nigeria, many construction Projects development have failed owing to the various technical and financial pressures of cost limit, quality and value optimization. Jagboro and Banalola (2005) wrote that the interim report of the Presidential panel on contracts at the wake of the present democratic government in Nigeria confirmed a staggering amount of over four hundred and fifty billion naira for project which can be classified as failed contracts, spanning from 1979 to 1998. The main reason for this is not far-fetched as many of the professional firms involved in project administration lack adequate management inputs in both quantitative and qualitative terms.

Another reason for this high rate of projects abandonment and failed contracts in Nigeria, is that in most government projects, the mobilization fee which is given to the contractor is reimbursed to those who awarded the contract as "bribe" usually of huge sums of money and this thereby increases the cost of the project, affects the quality of job executed by the contractor and will also leave the project either unexecuted or abandoned. This is because the money meant for the project execution have been diverted into individual pockets(Osemenam, 2004).

However, the design of building and other infrastructure is predicated on different contributors exhibiting various professional skills with a view to obtaining an optimum design solution. These inputs are based on the understanding of design and execution parameters ranging from functionality and usefulness of the project, aesthetics and appearance, safety of the structure, quality of workmanship, cost and financial matters and most importantly clients satisfaction with the project on completion. Business everywhere is faced with everyday challenges for survival and the need to adapt is very important. Appointing the project manager at the right time and seeking his professional advice for cost matters is a very key problem in the Nigerian construction delivery.

II. LITERATURE SURVEY

The term "cost" is ambiguous since it has several different meanings to different persons. To a financial or cost accountant, it means the main elements which go to make a product, hence basically classifying cost into material, labour and equipment cost. Hanson (2004) defined cost as "the cost of producing a certain output of a commodity. It is the sum of all the payments to the factors of production engaged on the production of that commodity".

Enyi (2007) refers to cost as "the expenses incurred on the course of realizing a revenue or implementing a project, this cost are fixed, variable and semi - variable in nature" To the "Pure" economist, cost must be viewed in realistic terms, in which case the real cost of any product or services is the cost of the alternative that was foregone. For instance, if a client has amount of money say N1,000,000.00 and is faced with the choice of erecting a residential building or a factory and the said client settles for the residential building, the real cost of the residential building is the factory that was forgone. The principles of barter economics (without the use of money) is very explicit and respected in this approach.

Besides, as stated in the oxford dictionary that cost is the price to be paid or amount of money needed for something, this means that cost is the actual liquid cash or money required for an exchange of goods and services. However, with respect to building works, Ferry 2004 highlighted that cost signifies cost to the client as distinct from the cost of labour, plant and materials incurred by contracting and sub-contracting organization. Hence, it implies the amount which the client will have to pay the contractor to construct the building but not the actual cost to the contractor of building it. Precisely, it is the amount paid by the client for either completed building or for specific section of building.

Moreover, Oforeh and Alufohai (2006) wrote that "to the construction economist, the products of the industry are regarded life objects that remain active throughout their life span. In the process of its existence or activity, some other elements of costs arise, aside from the initial costs. The true cost of a project therefore is an integral of the birth and lifetime cost of the project analyzed over anticipated and defined minimum quality or standard of performance."

On the other hand, management as defined by Stoner and Wankel is "the process of planning, organizing, leading and controlling the efforts of organizational members and of using all other organizational resources to achieve stated organization goals. Hall (2007) in his write up, defined management broadly as "getting things done through other people" so as to include top management and lower level management. Thus, there are many systems, techniques, approaches and tools of management. Management includes subjects like human relations, operational research, quantitative techniques, project management, Administration etc.

Thus, from the above definitions and reviews of cost and management, "the concept of cost management" in this research work is concisely defined as the process of utilizing the construction cost related resources of the construction sub-designated objectives. This definition treats the subject matter as a process of getting things done through working with people and using other resources. This is a fact because no project success can be achieved without proper integration of the project organization and actors.

More so, it has been well established that the activity costs otherwise known as maintenance costs or cost - in - always affect the initial cost of a project in many ways consequently, various initial costs may be possible for the same project subject to the quality and performance anticipated. Therefore, the approach of the construction economist is based on both the realistic and actualistic concepts against a background of identifiable performance related factors considered over time. This approach is the basis of cost planning executed by project managers on individual projects at the micro economic level of construction. Subsequently, apart from decision making, the task before the Project Manager can broadly be classified into cost planning and cost control.

III. COST BUDGETING

The concept budget defines the translation of an organizational plan into concrete form by way of resources allocation in form of cash. A budget is made up of two sides - Expenditure and Revenue. Just as budget have been used to plan country's economy, firms have been compelled because of the growing complexity in the construction industry to draw up budgets. It is through budgets that plans can be executed. Budgets are used to convert such plans and policies into qualitative and monetary terms which form the fundamental objectives of the firm. The process of budget estimates is used by firms to decide on policies of either expansion, contraction or maintaining the statuesque. It is this process which helps to shape the policy of the firm as regard future line of action depending on the market situation. The execution of any project by a contractor requires cost control.

Cost control is done by way of project planning and scheduling using different types of qualitative techniques available to the industry. The logic of these planning is to enable the contractor to exercise an effective control over his resources. It is the duty of the management team to ensure that tasks are carried out in accordance with the planned line of action. Fresh plans are prepared when changes are necessary and unavoidable. It is the desire to achieve these planned lines of action that a system of monitoring has to be initiated.

IV. COST MONITORING AND CONTROL SYSTEM

Controlling and monitoring of projects occurs when you establish ways to track the course of all activities and events in the project. As a project is always a dynamic entity since it must respond to changing conditions if it is to be completed successfully. It is carried out in an environment of ceaseless change and there is a continual need for re-assessment and re-appraisal of the project plan. Among the factors liable to alter the course of a project includes such changes in:

- The technical specification of the project.
- The project complete date.
- Budget considerations.
- Relative priorities of projects.
- Revision of activity duration estimates.
- Re-assessment of resource requirement for individual activities.
- Technical difficulties or construction methods.
- Unexpected weather conditions.
- Working conditions
- The economy
- Resource availability
- Management and among others.

However, some of these changes will have a pronounced impact on the project while others have a mere subtle one. Either way, the changes could affect the project in terms of quality, quantity of work, cost and time. To fully avoid this, a proper cost monitoring and control system must be established. At the onset, there is an important difference between monitoring and control.

Monitoring is finding out the state of play. It has to do with reporting whether one is measuring money or time or any other property in which one is interested. It is a vital pre-requisite to control but it is a tool needed by control rather than a substitute for it.

Control is taking whatever steps that are necessary to vary or alter a pattern of events. It is a positive and active operation which its success can be judged by subsequent events. Taking decisions in the exercise of control demands sound information which is the result of good monitoring.

V. SCHEDULE MONITORING

When a project is monitored to determine if everything is proceeding as scheduled, data collection along the following lines is necessary in order to detect the type of problems one might likely encounter:

- Collect information on any differences between estimated start dates and actual start dates for each activity.
- Determine any differences between estimated finish dates and actual finish dates for each activity of the entire project.
- Any unexpected delays or other abnormalities that alter the project's completion date.
- Any activities performed out of network sequence.
- Any milestone activities that appear unachievable.

Once the above stated information is collected and analyzed, a series of actions to rectify any situation can be performed. For example, a schedule can be up dated by re-assessing the duration of specific activities or one can re-sequence or eliminate activities reflected in the current version of his/her programme chart.

VI. RESOURCE MONITORING

To complete a project, three main resources are usually expanded: man, materials and equipment. When left uncontrolled, the cost associated with utilizing these resources will likely escalate, so there is need to really track closely the use of these resources.

Resources utilization could be determined in basically three ways: meeting, inspections and forms. Meetings (especially site) provide one with the opportunity to acquire information rapidly. Inspections allow one to witness what and how certain resources are being used by staff and other subordinates. While forms allow one to quantitatively determine the amount of resources being used and the cost associated with using those resources. In addition, forms serve as an excellent historical record on what occurs throughout the project.

VII. BUDGET MONITORING

A project is monitored to determine whether the progress is proceeding according to budgeted plans and one of the aim is to determine the overall financial condition of the project. This could be accomplished by detecting quantitative variation at any given point in time, either for a specific activity or the entire project. One can accumulate cost data from a series of sources, usually related to manpower, materials, overhead and other changes, compare the actual accumulated data for a particular activity or the entire project with the estimated cost. Analyze any difference variances and take such actions as curtailing resources devoted to a project on selecting alternative materials.

VIII. COST CONTROL

Control is defined as to check, verify or regulate. Planning enables management to establish realistic standards against which performance can be matched during contract. Cost control is used to maintain the cost within the budget by forecasting the expected cost through frequent short term planning exercises. Olateju (2003) emphasizes that the main objectives of monitoring and control are to ensure that the overall period of completing a project is not exceeded and this is achieved at the minimum cost.

IX. MATERIALS COST CONTROL

The prime purpose of material costing is to ensure that purchases do not exceed the planned distribution of budgeted expenditure for the project. As reported by Ibrionke (2004), the building establishment defines material control as covering realistic design, specification and procurement of good, their packaging, handling, storage and protection after fixing. The procurement of material is based on the material schedule already prepared during pre-contract planning so that any shortfall or excess can easily be determined during the project execution. Recovering report form, purchase order, material (store) requisition form are typical standard documents needed for material monitoring and control. Other important documents are invoices, delivery notes, advice notes, among others. All these are to ensure good financial discipline and proper material cost control.

X. LABOUR COST CONTROL

This involves the use of labour time and cost reports. Labour time card reports the hours of time for every trade man and the project cost codes to which the labour is applied. Also, the foreman or supervisor should record the hours spent by site labour.

The total gross payroll can then be debited to a labour variance account on a weekly basis and the weekly summary of man hours spent on each activity can be used to debit the labour cost to each activity account. The total of these debits can then be credited to the labour variance account. This man-hour have a dual purpose in placing the proper perspective on labour costing both for project control and for future estimating.

XI. EQUIPMENT (PLANT) COST CONTROL

Since equipment costs are usually expressed as a time rate of expense, time reporting is an important step in equipment cost reporting (Udoh 2004). The procedure for the preparation of equipment cost report is similar to that of labour. Equipment cost are matched with the corresponding quantities of work produced. The reports tend to summarize all equipment cost incurred on the project up to the effective date of the report. It helps to compare the estimated (as in plant schedule) with the actual equipment unit cost for each type of work.

XII. SUB - CONTRACTS

Sub contract performance and costing would be treated as a similar fashion to materials. Separate orders would be issued for each services to be performed and the accounting would be identical. It is essential in this case that the sub contractor in submitting his quotation is made fully aware of the implications of the system and of the effect on the project duration of his activities. In addition, certain specific event or milestones should be included in the network for an assessment of the sub contractor's performance and his progress payment would be tied to these control events. During the execution of the contract, it is necessary for all parties to cooperate in any desirable re-planning and to define and evaluate variations promptly so that modifications may be incorporated into the networks timely.

XIII. OVERHEADS AND INDIRECT COSTS:

Overheads and indirect cost are as much part of the project as the direct cost just described. Examples of indirect cost are cost of project services (Telephone, mail office, maintenance, utilities, indirect labour (materials handling, production control, etc) and other functions or area making a cost contribution to the work packages which may be difficult to measure directly. Many firms handle these costs by adding a fixed percentage to the direct cost of a work package or by distributing them pro rata (in proportion) to the total cost of the work package.

However, the tools used by management and cost supervisors for planning, monitoring and controlling of projects include among others.

- The Gantt chart and
- The network analysis which comprises
 - Critical path method (CPM)
 - Performance evaluation and review techniques (PERT)

XIV. THE GANTT CHART

Gantt Charts (commonly wrongly called gant charts) are extremely useful project management tools. The Gantt Chart is named after US engineer and consultant Henry Gantt (1861-1919) who devised the technique in the 1910s.

Gantt charts are excellent models for scheduling and for budgeting, and for reporting and presenting and communicating project plans and progress easily and quickly, but as a rule Gantt Charts are not as good as a Critical Path Analysis Flow Diagram for identifying and showing interdependent factors, or for 'mapping' a plan from and/or into all of its detailed causal or contributing elements.

You can construct a Gantt Chart using MS Excel or a similar spreadsheet. Every activity has a separate line. Create a time-line for the duration of the project (the breakfast example shows minutes, but normally you would use weeks, or for very big long-term projects, months). You can colour code the time blocks to denote type of activity (for example, intense, watching brief, directly managed, delegated and left-to-run, etc.) You can schedule review and insert break points. At the end of each line you can show as many cost columns for the activities as you need. The breakfast example shows just the capital cost of the consumable items and a revenue cost for labour and fuel. A Gantt chart like this can be used to keep track of progress for each activity and how the costs are running. You can move the time blocks around to report on actual versus planned, and to re-schedule, and to create new plan updates. Costs columns can show plan and actual and variances, and calculate whatever totals, averages, ratios, etc., that you need. Gantt Charts are probably the most flexible and useful of all project management tools, but remember they do not very easily or obviously show the importance and inter-dependence of related parallel activities, and they won't obviously show the necessity to complete one task before another can begin, as a Critical Path Analysis will do, so you may need both tools, especially at the planning stage, and almost certainly for large complex projects.

A wide range of computerized systems/software now exists for project management and planning, and new methods continue to be developed. It is an area of high innovation, with lots of scope for improvement and development. I welcome suggestions of particularly good systems, especially if inexpensive or free. Many organizations develop or specify particular computerized tools, so it's a good idea to seek local relevant advice and examples of best practice before deciding the best computerized project management system(s) for your own situation.

Project planning tools naturally become used also for subsequent project reporting, presentations, etc., and you will make life easier for everyone if you use formats that people recognize and find familiar.

XV. THE NETWORK ANALYSIS

Network analysis is a method of planning and controlling cost by recording their inter-dependency in a diagrammatic form that enables each fundamental problem involved to be tackled separately. Network analysis techniques achieve their purpose in three broad steps:

- (A) They present a diagrammatic form and picture of all the jobs (or activities) to be done and of their dependency on one another.
- (B) They consider the limitations imposed by the availability of estimate and the time required to do each job.
- (C) They apply the estimated job time to the network diagram and then analyses the network. Analysis in this case means the calculation of the total length of time involved in path through the network.

Network analysis comprises the critical path method (CPM) and the performance evaluation and review techniques (PERT). The CPM network diagram unlike the Gantt chart provides enough detailed information to assess the effect of a delay associated with any particular phase or activity. The CPM diagrams provides more "Micro" information than "Macro" information i.e., it provides more specification to evaluate the progress of a project.

The major advantage of the CPM is the clear identification of the critical and non-critical activities which helps in the diversion of construction resources when necessary especially when there are delays in critical activities. The performance evaluation and review techniques (PERT) is best for new and complex projects with extreme degree of uncertainty. To update CPM diagrams, one need to collect information, otherwise the diagram becomes merely a historical document rather than an action tool. One can collect information from many sources including existing documentation, meeting and discursion with project participants.

XVI. METHODOLOGY

Based on the objectives of the study, the research data was collected from construction companies in Port Harcourt Rivers State and analyzed.

Information gathered from these firms is believed to be able to be a representative result of the population of construction firms that could be expected to use cost management and control process in the execution of projects.

Generally, data were sourced from two main sources. Primary and secondary data sources were collected by means of personal interviews and questionnaire distributed to construction industry principal actors/participants both in public and private sector of the economy.

Also secondary data collection was based mainly on the review of related past literature and write ups on Nigerian economy and construction cost management. Detailed references were made to books, journals, conference/seminar papers, News papers reports and other forms of published materials that were considered relevant to the research subject matter.

XVII. RESULTS AND DISCUSSION

Since the evolution of cost management and its subsequent application in the building industry, the practitioners/consultants have desired numerous benefits from the effectiveness thus commending it for its more functional and practical approach to cost control of project.

Various management techniques especially planning have been developed. Such planning tools like the Network analysis and bar-chart have helped in the early planning of construction projects on which the application of other cost project management techniques are based. As the work progresses on the site, more planning like - term planning is carried out so as to maintain the initial programme. Such techniques like organization, supervision, implementation and control are equally applied on already plan so as to make sure that there are no deviations on the original master programme.

The rising cost of building materials nowadays and the ultimate astronomical increase in the cost of construction projects calls for adequate application of cost management principles so as to reduce or eliminate the cost of projects. When management techniques are appropriately utilized during the construction of any price of work right away from the planning stage to the completion period exhausting all other principles of cost management, the cost of such a scheme must be within the target cost.

Just as construction is money, the development of cost management and its right application as a tool for cutting down cost can best be done by such professional like the Quantity surveyor who should receive a further training in the art of cost management. The training of a Quantity surveyor like other professional (Architects, Builders, Engineers, Estate Managers etc) does not expose him so much to the principle and application of project management in the field. However the programme of master degree level where he can learn purely project management puts him in the best footing as a building cost accountant with embodiment of project management. With his full knowledge of cost and project management he can then apply this best in the cost control of project.

Most of the abandoned building projects are as a result of poor or total lack of project management and as such no cost control of such schemes. The teaching of project management in line with cost control measures should be therefore be included in the programmes in the training of the professionals especially the Quantity Surveyor whose knowledge of cost outweighs any other professional in the building industry. Therefore, construction industry will continue to experience peace if project management being a tool modeled to control cost of projects is strictly adhered to.

XVIII. RECOMMENDATIONS

In order to achieve the tremendous benefits of cost management as means of cost control, the cost manager must adhere strictly to the information contained in the overall programme chart and make changes where ever necessary and applying both his personal experience and intelligence at the same time. All other professionals, operatives and even the client should be capable of carrying out their own part of the task effectively and in time too. The cost manager (E.G the Quantity surveyor trained specifically for the purpose) should also exhibit the foresight of an average reasonable man in predicting and arresting those inherent constraints that are associated with building projects which may either retard the progress of the work or extend the pre-determined project duration. He should carry out his function with reasonable care and skill.

To this end and in line with the research questions stated earlier, I recommend the following solutions or strategies as a means for improving capital project management under the current economic situation in Nigeria.

- The need for change management: Cost managers of construction industry should enhance the inevitability of change because predicting business outcomes in a volatile and depressed economic environment is unquestionable and a herculean task. Hence, they should therefore design suitable framework for change management by evolving techniques which could assist in assimilating and adapting to changes.
- Effective cost planning, monitoring and control should be vigorously pursued by both the client and the contractor as this will help to keep track of progress in implementation of project in relation to targets, timely removal of constraints and corrective actions taken as required. This is because we cannot keep productivity at a high level in the construction industry without adequate planning of the business. to this end, whatever the level of uncertainty, we just cannot do without planning.
- Awards of government contracts should be to the professionals on competitive bidding and not for someone who is "highly connected" so that meaningful and total management should be achieved without dubious manipulation.
- There are several natural resources such as stones, clay, limestone in the country which can be tapped and utilized and this will facilitate the development of indigenous construction materials industry and reducing the volume of imports. More encouragement by way of better condition of service, annual bonus and better pay should be given to the workers and management at the various government owned companies e.g. cement industries etc to make them put in their best and help reduce the shortage of these essential construction materials.

XIX. CONCLUSIONS

It is the resources well managed or mismanaged today that makes for tomorrows prosperity or depression. the economic depression we are now facing is more out of mismanagement of resources than lack of resources.

The key to the success of our construction investment industry is professional management. There is urgent need for innovations in the management of our construction resources for a viable product as the relationship between inflation and cost of construction is directly proportional. However, in the type of economic environment x-rayed in the above chapters, the point has been made clear that the task before cost managers of the construction industry under such conditions are more difficult than in normal conditions. Nevertheless, it creates special challenges for managers of construction cost and/or industry to ensure the survival and structural strength of their organization. This can be achieved only through optimal use and management of construction resources.

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