On some projects, especially ones of smaller scope, cost estimating and cost budgeting are so tightly linked that they are viewed as a single process that can be performed by a single person over a relatively short period of time. These processes are presented here as distinct processes because the tools and techniques for each are different. The ability to influence cost is greatest at the early stages of the project, making early scope definition critical.

The work involved in performing the three processes of Project Cost Management preceded by a planning effort of the project management team. This planning effort is part of the Develop Project Management Plan process, which produces a cost management plan that sets out the format and establishes the criteria for planning, structuring, estimating, budgeting, and controlling project costs. The cost management processes and their associated tools and techniques are usually selected during the project life cycle definition, and are documented in the cost management plan. For example, the cost management plan can establish the following:

a. Level of accuracy. Activity cost estimates will adhere to a rounding of the data to a prescribed precision (e.g. N100, N1, 000), based on the scope of the activities and magnitude of the project, and may include an amount for contingencies.

b. Units of measure. Each unit used in measurements (such as staff hours, staff days, weeks, or lump sum) is defined for each of the resources.

c. Organizational procedures links. The work breakdown structure (WBS) provides the framework for the cost management plan, allowing for consistency with the estimates, budgets and control of costs. The WBS component used for the project cost accounting is called the Control Account (CA). Each control account is assigned a unique code or account number(s) that links directly to the performing organization's accounting system.

d. Control thresholds. Variance thresholds for monitoring cost performance may be specified to indicate an agreed-upon amount of variation to be allowed before some action needs to be taken. Thresholds are typically expressed as percentage deviations from the baseline plan.

e. Rules of performance measurement. Earned value management (EVM) rules of performance measurement are set. For example, the cost management plan could:

- Define the WBS and points at which measurement of control accounts will be performed,
- Establish the earned value measurement techniques (e.g., weighted milestones, fixed formula, percent complete, etc.) to be employed, and
- Specify the earned value management computation equations for determining the projected estimate at completion (EAC) forecasts and other tracking methodologies.

f. Reporting formats. The formats and frequency for the various cost reports are defined.

g. Process descriptions. Descriptions of each of the three cost management processes are documented,
All of this information is included in the cost management plan, a component of the project management plan, either as text within the body of the plan or as appendices. The cost management plan may be formal or informal, highly detailed or broadly framed, based upon the needs of the project.

Project Cost Management should consider the stakeholder requirements for capturing costs. Different stakeholders will measure project costs in different ways and at different times. For example, the cost of an acquired item can be measured when the acquisition decision is made or committed, the order is placed, the item is delivered, or the actual cost is incurred or recorded for project accounting purposes.

Project Cost Management is primarily concerned with the cost of the resources needed to complete project activities. Project Cost Management should also consider the effect of project decisions on the subsequent recurring cost of using, maintaining, and supporting the product, service, or result of the project. For example, limiting the number of design reviews can reduce the cost of the project but could do so by increasing the client's operating costs.

In many organizations, predicting and analyzing the prospective financial performance of the project's product is done outside the project. In others, such as a capital facilities project, Project Cost Management can include this work. When such predictions and analyses are included, Project Cost Management may address additional processes and numerous general management techniques such as return on investment, discounted cash flow, and investment payback analysis.

The cost management planning effort occurs early in project planning and sets the framework for each of the cost management processes so that performance of the processes will be efficient and coordinated.

6.1 Estimate Costs

Estimate Costs is the process of developing an approximation of the monetary resources needed to complete Project activities. Cost estimates are a prediction that is based on the information known at a given point in time. It includes the identification and consideration of costing alternatives to initiate and complete the project. Cost trade-offs and risks must be considered, such as make versus buy, buy versus lease, and the sharing of resources in order to achieve optimal costs for the project.

Cost estimates are generally expressed in units of some currency (i.e. naira, dollars, euro, yen, etc). Although in some instances other units of measure, such as staff hours or staff days, are used to facilitate comparisons eliminating the effects of currency fluctuations.

Cost estimates should be refined during the course of the project to reflect additional detail as it become available. The accuracy of a project estimate will increase as the project progresses through the project life cycle. Hence cost estimating is an iterative process from phase to phase. For example, a project in the initial phase could have a rough order of magnitude (ROM) estimate in the range of +50%. Later in the project as more information is known, estimates could narrow to a range of +10%. In some organizations, there are guidelines for when such refinements can be made and the degree of accuracy that is expected.

Sources of Input information are derived from the outputs of project processes in other knowledge Areas. Once received, all of this information will remain available as inputs to all three of the cost management processes.

Costs are estimated for all resources that will be charged to the project. This includes, but is not limited, labor, materials, equipment, services, and facilities, as well as special categories such as an inflation allowance or contingency costs. A cost estimate is a quantitative assessment of the likely costs for resources required to complete the activity.

i. Inputs in Estimate Costs

a. Scope Baseline

- **Scope statement**. The scope statement provides the product description, acceptance criteria, key

deliverables, project boundaries, assumptions, and constraints about the project. One basic assumption that needs to be made when estimating project cost is whether the estimates will be limited to direct project costs only or whether the estimates will also include indirect costs. ndirect costs are those costs that cannot be directly traced to a specific project and therefore will be accumulated and allocated equitably over multiple projects by some approved and documented accounting procedure. One of the most common constraints for many projects is a limited project budget. Examples of other constraints are required delivery dates, available skilled resources, and organizational policies.

- **Work breakdown structure**. The project WBS provides the relationships among all the components of the project and the project deliverables.

- **WBS dictionary**. The WBS dictionary and related detailed statements of work provide an identification of the deliverables and a description of the work in each WBS component required to produce each deliverable. Additional information that may be found in the scope baseline that includes requirements with contractual and legal implications are health, safety, security, performance, environmental, insurance, intellectual property rights, licenses, and permits. All of this information should be considered before developing the cost estimates.

b. Project Schedule

The type and quantity of resources and the amount of time which those resources are applied to complete the work of the project are major factors in determining the project cost. Schedule activity resources and their respective durations are used as key inputs to this process. Estimate Activity Resources involves determining the availability and quantities required of staff and materials needed to perform schedule activities. It is closely coordinated with cost estimating. Activity duration estimates will affect cost estimates on any project where the project budget includes an allowance for the cost of financing (including interest charges) and where resources are applied per unit of time for the duration of the activity. Activity duration estimates can also affect cost estimates that have time-sensitive costs included in them, such as union labor with regularly expiring collective bargaining agreements or materials with seasonal cost variations.

c. Human Resource Plan

Project staffing attributes, personnel rates, and related rewards/recognition are necessary components for developing the project cost estimates.

d. Risk Register

The risk register should be reviewed to consider risk mitigation costs. Risks, which can be either threats or opportunities, typically have an impact on both activity and overall project costs. As a general rule when the project experiences a negative

risk event, the near-term cost of the project will usually increase and there will sometimes be a delay in the project schedule.

e. Enterprise Environmental Factors

The enterprise environmental factors that influence the Estimate Costs process include, but are not limited to:

- **Market conditions.** Market conditions describe what products, services, and results are available in the market, from whom, and under what terms and conditions. Regional and/or global supply and demand conditions greatly influence resource costs.
- **Published commercial information**. Resource cost rate information is often available from commercial databases that track skills and human resource costs, and provide standard costs for material and equipment. Published contractor price lists are another source of information.

f. Organizational Process Assets

The organizational process assets that influence the Estimate Costs process include but are not limited to:

- Cost estimating policies,
- Cost estimating templates,
- Historical information, and
- Lessons learned.

ii. Tools and Techniques in Estimate Costs

a. Expert Judgments

Cost estimates are influenced by numerous variables such as

labor rates, material costs, inflation risk factors, and other variables. Expert judgment, guided by historical information, provides valuable insight about the environment and information from prior similar projects. Expert judgment can be used to determine whether to combine methods of estimating and how to reconcile differences between them.

b. Analogous Estimating

Analogous cost estimating uses the values of parameters, such as scope, cost, budget, and duration or measures of scale such as size, weight, and complexity, from a previous, similar project as the basis for estimating the same parameter or measure for a current project. When estimating costs, this technique relies on the actual cost of previous, similar projects as the basis for estimating the cost of the current project. It is a gross value estimating approach, sometimes adjusted for known differences in project complexity.

Analogous cost estimating is frequently used to estimate a parameter when there is a limited amount of detailed information about the project,for example, in the early phases of a project. Analogous estimating uses historical information and expert judgment.

Analogous cost estimating is generally less costly and time consuming than other techniques but it is also generally less accurate. Analogous cost estimates can be applied to a total projector to segments of a project used in conjunction with other estimating methods. Analogous estimating is most reliable when the previous projects are similar in fact and not

just in appearance, and the project team members preparing the estimates have the needed expertise.

c. Parametric Estimating

Parametric estimating uses a statistical relationship between historical data and other variables (e.g., square footage in construction) to calculate an estimate for activity parameters such as cost, budget, and duration. This technique can produce higher levels of accuracy depending upon its sophistication and underlying data built into the model. Parametric cost estimates can be applied to a total project or to segments of a project in conjunction with other estimating methods.

d. Bottom-Up Estimating

Bottom-up estimating is a method of estimating a component of work. The cost of individual work packages or activities is estimated with the greatest level of specified detail. The detailed Cost is then summarized or rolled up" to higher levels for subsequent reporting and tracking purposes. The cost and accuracy of bottom-up cost estimating is typically influenced by the size and complexity of the individual activity or work package.

e. Three-Point Estimates

The accuracy of single-point activity cost estimates can be improved by considering estimation uncertainty and risk. This concept originated with the program evaluation and review technique (PERT). PERT uses three estimates to define an approximate range for an activity's cost.

- **Most likely (C_M).** The cost of the activity, based on realistic effort assessment for the required work and any predicted expenses.
- **Optimistic: (C_o).** The activity cost based on analysis of the best case scenario for the activity.
- **Pessimistic (C_p).** The activity cost based on analysis of the worst case scenario for the activity.

PERT analysis calculated on expected (C_E) activity cost using a weighted average of these three estimates:

$$C_E = \frac{C_O + 4C_M + C_P}{6}$$

Cost estimates based on this equation (or even on a simple average of the three points) may provide more accuracy, and the three points clarify the range of uncertainty of the cost estimates.

f. Reserve Analyses

Cost estimates may include contingency reserves (sometimes called contingency allowances) to account for cost uncertainty. The contingency reserve may be a percentage of the estimated cost, a fixed number, or may be developed by using quantitative analysis methods.

As more precise information about the project becomes available, the contingency reserve may be used, reduced or eliminated. Contingency should be clearly identified in cost documentation. Contingency reserves are part of the funding requirements.

g. Cost of Quality

Assumptions about costs of quality may be used to prepare the activity cost estimate.

h. Project Management Estimation Software

Project management cost estimating software applications, computerized spreadsheets, simulation and statistical tools are becoming more widely accepted to assist with cost estimating. Such tools can simplify the use of some cost estimating techniques and thereby facilitate rapid consideration of cost estimate alternatives.

i. Vendor Bid Analysis

Cost estimating methods may include analysis of what the project should cost, based on the responsive bids from qualified vendors. Where projects are awarded to a vendor under competitive processes, additional cost estimating work can be required of the project team to examine the price of individual deliverables and to derive a cost that supports the final total project cost.

iii. Outputs from Estimate Costs

a. Activity Cost Estimates

Activity cost estimates are quantitative assessments of the probable costs required to complete project work. Cost estimates can be presented in summary form or in detail. Costs are estimated for all resources that are applied to the activity cost estimate. This includes, but is not limited to, direct labour, materials, equipment, services, facilities, information technology, and special categories such as an inflation

allowance or a cost contingency reserve. Indirect costs, if they are included in the project estimate, can be included at the activity level or at higher levels.

b. Basis of Estimates

The amount and type of additional details supporting the cost estimate vary by application area. Regardless of the level of detail, the supporting documentation should provide a clear and complete understanding of how the cost estimate was derived. Supporting detail for activity cost estimates may include:

- Documentation of the basis of the estimate (i.e., how it was developed),
- Documentation of all assumptions made,
- Documentation of any known constraints,
- Indication of the range of possible estimates (e.g., N10,000 (±10%) to indicate that the item expected to cost between a range of values), and
- Indication of the confidence level of the final estimate.

c. Project Document Updates

Project documents that may be updated include, but are not limited to, the risk register:

6.2 Determine Budget

Determine Budget is the process a aggregating the estimated costs of individual activities or work packages to establish an authorized cost, baseline This baseline includes all authorized budgets, but exclude- management reserves.

The project budget constitutes the funds authorized to execute

the project. Project cost performance will be measured against the authorized budget.

i. Inputs in Determine Budget

a. Activity Cost Estimates

Cost estimates for each activity within a work package are aggregated to obtain a cost estimate for each work package.

b. Basis of Estimates

Supporting detail for cost estimates should be specified. Any basic assumptions dealing with the inclusion or exclusion of indirect costs in the project budget are specified in the basis of estimates.

c. Scope Baseline

- **Scope Statement**. Formal limitations by period for the expenditure of project funds can be mandated by the organization, by contract or by other entities such as government agencies. These funding constraints are reflected in the project scope statement.
- **Work breakdown structure**. The project WBS provides the relationships among all the project deliverables and their various components.
- **WBS dictionary**. The WBS dictionary and related detailed statements of work provide an identification of the deliverables and a description of the work in each WBS component required to produce each deliverable.

d. Project Schedule

The project schedule, as part of the project management plan, includes planned start and finish dates for the project's activities, milestones, work packages, planning packages, and control accounts. This information can be used to aggregate costs to the calendar periods in which the costs are planned to be incurred.

e. Resource Calendars

Resource calendars provide information on with resources are assigned to the project and when they are assigned. This information can be used to indicate resource costs over the duration of the project

f. Contracts

Applicable contract information and costs relating to products, services, or results that have purchased are included when determining the budget.

g. Organizational Process Assets

The organizational process assets that influence the Determine Budget process include but not limited to:

- Existing formal and informal cost, budgeting-related policies, procedures, aid guidelines,
- Cost budgeting tools, and
- Reporting methods

ii. Tools and Techniques for Budget Determination

a. Cost Aggregation

Cost estimates are aggregated by work packages in accordance

with the WBS. The work package cost estimates are then aggregated for the higher component levels of the WBS (such as control accounts) and ultimately for the entire project.

b. Reserve Analysis

Budget reserve analysis can establish both the contingency reserves and the management reserves for the project. Contingency reserves are allowances for unplanned but potentially required changes that can result from realized risks identified in the risk register. Management reserves are budgets reserved for unplanned changes to project scope and cost. The project manager may be required to obtain approval before obligating or spending management reserve. Management reserves are not a part of the project cost baseline, but may be included in the total budget for the project. They are not included as a part at the earned value measurement calculations.

C. Expert Judgment

Judgment provided based upon expertise in an application area, knowledge area, discipline, industry, etc., as appropriate for the activity being performed should be used in determining the budget. Such expertise may be provided by any group or person with specialized education, knowledge, skill, experience, or training. Expert judgment is available from many sources, including, but not limited to:

- Other units within the performing organization,
- Consultants,

- Stakeholders, including customers,
- Professional and technical associations, and
- Industry groups

d. Historical Relationships

Any historical relationships that result in parametric estimates or analogous estimates involve the use of project characteristics (parameters) to develop mathematical models to predict total project costs. Such models can be simple (e.g., residential home construction is based on a certain cost per square foot of space) or complex (e.g., one model of software development costing uses multiple separate adjustment factors, each of which has numerous points within it).

Both the cost and accuracy of analogous and parametric models can vary widely. They are most likely to be reliable when:

- Historical information used to develop the model is accurate,
- Parameters used in the model are readily quantifiable, and
- Models are scalable, such that they work for a large project, a small project and phases of a project.

e. Funding Limit Reconciliation

The expenditure of funds should be reconciled with any funding limits on the commitment of funds for the project. A variance between the funding limits and the planned

expenditures will sometime necessitate the rescheduling of work to level out the rate of expenditures. This can be accomplishes by placing imposed date constraints for work into the project schedule.

iii. Outputs from Determine Budget

a. Cost Performance Baseline

The cost performance baseline is an authorized time-phased budget at completion (BAC) used to measure, monitor, and control overall cost performance on the project. It is developed as a summation of the approved budgets by time period and is typically displayed in the form of an S-curve. In the earned value management technique the cost performance baseline is referred to as the performance measurement baseline (PMB).

b. Project Funding Requirements

Total funding requirements and periodic funding requirements (e.g., quarterly, annually) are derived from the cost baseline. The cost baseline will include projected expenditures plus anticipated liabilities. Funding often occurs in incremental amounts that are not continuous, which appear as steps. The total funds required are those included in the cost baseline, plus management reserves, if any.

C. Project Document Updates

Project documents that may be updated include but are not limited to:

- Risk register,
- Cost estimates, and
- Project schedule.

6.3 Control Costs

Control Costs is the process of monitoring the status of the project to update the project budget and managing changes to the cost baseline. Updating the budget involves recording actual costs spent to date. Any increase to the authorized budget can only be approved through the Perform Integrated Change Control process. Monitoring the expenditure of funds without regard to the value of work being accomplished for such expenditures has little value to the project other than to allow the project team to stay within the authorized funding. Thus much of the effort of cost control involves analyzing relationship between the consumption of project funds to the physical work being accomplished for such expenditures. The key to effective cost control is the management of the approved cost performance baseline of the changes to that baseline.

Project cost control includes:

- Influencing the factors that create changes to the authorized cost baseline,
- Ensuring that all change requests are acted on in a timely manner,
- Managing the actual changes when and as they occur,
- Ensuring that cost expenditures do not exceed the authorized funding, by period and in total for the project,
- Monitoring cost performance to isolate and understand variances from the approved cost baseline,
- Monitoring work performance against funds expended,
- Preventing unapproved changes from being included in the reported cost or resource usage,
- Informing appropriate stakeholders of all approved changes and associated cost, and

- Acting to bring expected cost overruns within acceptable limits.

Project cost control seeks out the causes of positive and negative variances and is part of the Perform Integrated Change Control process.

i. Inputs in Control Costs

a. Project Management Plan

The project management plan contains the following information that is used to control cost:

- **Cost performance baseline**. The cost performance baseline is compared with actual results to determine if a change, corrective action or preventive action is necessary.
- **Cost management plan.** The cost management plan describes how the project costs will be managed and controlled.

b. Project Funding Requirements

Project funding requirements explains various funding options available for project financing.

c. Work Performance information

Work performance information includes information about project progress, such as which deliverables have started, their progress and which deliverables have finished. Information also includes costs that have been authorized and incurred, and estimates for completing project work.

d. Organizational Process Assets

The organizational process assets that can influence the Control Costs process include, but are not limited to:

- Existing formal and informal cost control-related policies, procedures, and guidelines;
- Cost control tools: and
- Monitoring and reporting methods to be used,

ii. Tools and Techniques for Cost Control

a. Earned Value Management

Earned value management (EVM) in its various forms is a commonly used method of performance measurement. It integrates project scope, cost, and schedule measures to help the project management team assess and measure project performance and progress. It is a project management technique that requires the formation of an integrated baseline against which performance can be measured for the duration of the project. The principles of EVM can be applied to all projects, in any industry. EVM develops and monitors three key dimensions for each work package and control account:

- **Planned value.** Planned value (PV) is the authorized budget assigned to the work to be accomplished for an activity or work breakdown structure component. It includes the detailed authorized work, plus the budget for such authorized work, allocated by phase over the life of the project. The total of the PV is sometimes

referred to as the performance measurement baseline (PMB). The total planned value for the project is also known as Budget At Completion (BAC).

- **Earned value.** Earned value (EV) is the value of work performed expressed in terms of the approved budget assigned to that work for an activity or work breakdown structure component. It is the authorized work that has been completed, plus the authorized budget for such completed work. The EV being measured must be related to the PV baseline (PMB), and the EV measured cannot be greater than the authorized PV budget for a component. The term EV is often used to describe the percentage completion of a project. Progress measurement criteria should be established for each WBS component to measure work in progress. Project managers monitor EV, both incrementally to determine current status and cumulatively to determine the long-term performance trends.

- **Actual cost.** Actual cost (AC) is the total cost actually incurred and recorded in accomplishing work performed for an activity or work breakdown structure component. It is the total cost incurred in accomplishing the work that the EV measured. The AC has to correspond in definition to whatever was budgeted for in the PV and measured in the EV (e g., direct hours only, direct costs only, or all costs including indirect costs). The AC will have no

referred to as the performance measurement baseline (PMB). The total planned value for the project is also known as Budget At Completion (BAC).

- **Earned value.** Earned value (EV) is the value of work performed expressed in terms of the approved budget assigned to that work for an activity or work breakdown structure component. It is the authorized work that has been completed, plus the authorized budget for such completed work. The EV being measured must be related to the PV baseline (PMB), and the EV measured cannot be greater than the authorized PV budget for a component. The term EV is often used to describe the percentage completion of a project. Progress measurement criteria should be established for each WBS component to measure work in progress. Project managers monitor EV, both incrementally to determine current status and cumulatively to determine the long-term performance trends.

- **Actual cost.** Actual cost (AC) is the total cost actually incurred and recorded in accomplishing work performed for an activity or work breakdown structure component. It is the total cost incurred in accomplishing the work that the EV measured. The AC has to correspond in definition to whatever was budgeted for in the PV and measured in the EV (e g., direct hours only, direct costs only, or all costs including indirect costs). The AC will have no

upper limit; whatever is spent to achieve the EV will be measured.

Variances from the approved baseline will also be monitored:

- **Schedule variance.** Schedule variance (SV) is a measure of schedule performance on a project. It is equal to the earned value (EV) minus the planned value (PV). The EVM schedule variance is a useful metric in that it can indicate a project falling behind its baseline schedule. The EVM schedule variance will ultimately equal zero when the project is completed because all of the planned values will have been earned. EVM SVs are best used in conjunction with critical path methodology (CPM) scheduling and risk management. Equation: SV – EV PV.

- **Cost variance.** Cost variance (CV) is a measure of cost performance on a project. It is equal to the earned value (EV) minus the actual costs (AC). The cost variance at the end of the project will be the difference between the budget at completion (BAC) and the actual amount spent. The EVM CV is particularly critical because it indicates the relationship of physical performance to the costs spent. Any negative EVM CV is often non-recoverable to the project.
  Equation: CV= EV AC.

The SV and CV values can be converted to efficiency indicators to reflect the cost and schedule performance of any project for comparison against all other projects or within a portfolio of projects. The variances and indices are useful for determining project status and providing a basis for estimating project cost and schedule outcome.

- **Schedule performance index.** The schedule performance index (SPI) is a measure of progress achieved compared to progress planned on a project. It is sometimes used in conjunction with the cost performance index (CPI) to forecast the final project completion estimates. An SPI value less than 1.0 indicates less work was completed than was planned. An SPI greater than 1.0 indicates that more work was completed than was planned. Since the SPI measures all project work, the performance and the critical path must also be analyzed to determine whether the project will finish ahead of or behind its planned finish date. The SPI is equal to the ratio of the EV to the PV. Equation: SPI = EV/PV,

- **Cost performance index.** The cost performance index (CPI) is a measure of the value of work completed compared to the actual cost or progress made on the project. It is considered the most critical EVM metric and measures the cost efficiency for the work completed. A CPI value less than 1.0 indicates a cost overrun for work completed. A CPI value greater than 1.0 indicates a cost under run of performance to date. The CPI is equal to the ratio of the EV to the AC. Equation. CPI = EV/AC.

The three parameters of planned value, earned value, and actual cost can be monitored and reported on both a period-by-period basis (typically weekly or monthly) and on a cumulative basis.

b. Forecasting

As the project progresses, the project team can develop a forecast for the estimate at completion (EAC) that may differ from the budget at completion (BAC) based on the project performance. If it becomes obvious that the BAC is no longer viable, the project manager should develop a forecasted EAC. Forecasting the EAC involves making estimates or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast. Forecasts are generated, updated, and reissued based on work performance information provided as the project is executed. The work performance information covers the project's past performance and any information that could impact the project in the future.

EACs are typically based on the actual costs incurred for work completed, plus an estimate to complete (ETC) the remaining work. It is incumbent on the project team to predict what it may encounter to perform the ETC, based on its experience to date. The EVM method works well in conjunction with manual forecasts of the required EAC costs. The most common EAC forecasting approach is a manual, bottom-up summation by the project manager and project team.

The project manager's bottom-up EAC method builds upon the actual costs and experience incurred for the work completed,

and requires a new estimate to complete the remaining project work. This method may be problematic in that it interferes with the conduct of project work. The personnel who are performing the project work have to stop working to provide a detailed bottom-up ETC of the remaining work. Typically there is no separate budget to perform the ETC, so additional costs are incurred for the project to conduct the ETC. Equation: EAC = AC + bottom-up ETC.

The project manager's manual EAC can be quickly compared with a range of calculated EACs representing various risk scenarios. While EVM data can quickly provide many statistical EACs, only three of the more common methods are described as follows:

- **EAC forecast for ETC work performed at the budgeted rate.** This EAC method accepts the actual project performance to date (whether favorable or unfavorable) as represented by the actual costs, and predicts that all future ETC work will be accomplished at the budgeted rate. When actual performance is unfavorable, the assumption that future performance will improve should be accepted only when supported by project risk analysis.

  Equation: EAC = AC + BAC EV.

- **EAC forecast for ETC work performed at the present CPI.** This method assumes what the project has experienced to date can be expected to continue in the future. The ETC work is

and requires a new estimate to complete the remaining project work. This method may be problematic in that it interferes with the conduct of project work. The personnel who are performing the project work have to stop working to provide a detailed bottom-up ETC of the remaining work. Typically there is no separate budget to perform the ETC, so additional costs are incurred for the project to conduct the ETC. Equation: EAC = AC + bottom-up ETC.

The project manager's manual EAC can be quickly compared with a range of calculated EACs representing various risk scenarios. While EVM data can quickly provide many statistical EACs, only three of the more common methods are described as follows:

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  Equation: EAC = AC + BAC EV.

- **EAC forecast for ETC work performed at the present CPI.** This method assumes what the project has experienced to date can be expected to continue in the future. The ETC work is

assumed to be performed at the same cumulative cost performance index (CPI) as that incurred by the project to date. Equation: EAC = BAC / cumulative CPI.

- **EAC forecast for ETC work considering both SPI and CPI factors.** In this forecast, the ETC work will be performed at an efficiency rate that considers both the cost and schedule performance indices. It assumes both a negative cost performance to date, and a requirement to meet a firm schedule commitment by the project. This method is most useful when the project schedule is a factor impacting the ETC effort. Variations of this method weigh the CPI and SPI at different values (e.g., 80/20, 50/50, or some other ratio) according to the project manager's judgment.

  Equation: AC + (BAC − EV)/(cumulative CPI x cumulative BPI)].

Each of these approaches can be correct for any given project and will provide the project management team with an "early warning" signal if the EAC forecasts are not within acceptable tolerances.

c. To-Complete Performance Index (TCPI)

The to-complete performance index (TCPI) is the calculated projection of cost performance that must be achieved on the remaining work to meet a specified management goal, such as the BAC or the EAC. If it becomes obvious that the BAC is no longer viable, the project manager develops a forecasted

estimate at completion (EAC). Once approved, the EAC effectively supersedes the BAC as the cost performance goal.

TCPI based on the BAC = Work remaining (BAC EV) / Funds remaining (BAC AC).

If the cumulative CPI falls below the baseline plan, all future work of the project will need to immediately be performed in the range of the TCPI (BAC)to stay within the authorized BAC. Whether this level of performance is achievable is a judgment call based on a number of considerations, including risks, schedule, and technical performance. Once management acknowledges that the BAC is no longer attainable, the project manager will prepare a new estimate at completion (EAC) for the work, add once approved, and the project will work to the new EAC value. This level of performance is displayed as the TCPI (EAC) line. The equation for the TCPI based on the EAC: (BAC EV)/(EAC AC).

d. Performance Reviews

Performance reviews compare cost performance over time, schedule activities or work packages, overrunning and under running the budget and estimated funds needed to complete work in progress. If EVM is being used, the following information is determined:

- **Variance analysis.** Variance analysis as used in EVM compares actual project performance to planned or expected performance. Cost and schedule variances are the most frequently analyzed

- **Trend analysis.** Trend analysis examines project performance over time to determine if performance is improving or deteriorating. Graphical analysis techniques are valuable for understanding performance to date and for comparison to future performance goals in the form of BAC versus EAC and completion dates.
- **Earned value performance.** Earned value management compares the baseline plan to actual schedule and cost performance.

e. Variance Analysis

Cost performance measurements (CV, CPI) are used to assess the magnitude of variation to the original cost baseline. Important aspects of project cost control include determining the cause and degree of variance relative to the cost performance baseline and deciding whether corrective or preventive action is required. The percentage range of acceptable variances will tend to decrease as more work is accomplished. The larger percentage variances allowed at the start of the project can decrease as the project nears completion.

f. Project Management Software

Project management software is often used to monitor the three EVM dimensions (PV,EV, and AC), to display graphical trends, and to forecast a range of possible final project results.

iii. Outputs from Control Costs

a. Work Performance Measurements

The calculated CV, SV, CPI, and SPI values for WBS

components, in particular the work packages and control accounts, are documented and communicated to stakeholders.

b. Budget Forecasts

Either a calculated EAC value or a bottom-up EAC value is documented and communicated to stakeholders.

c. Organizational Process Assets Updates

Organizational process assets that may be updated include, but are not limited to:

- Causes of variances,
- Corrective action chosen and the reasons, and
- Other types of lessons learned from project cost control.

d. Change Requests

Analysis of project performance can result in a change request to the cost performance baseline or other components of the project management plan. Change requests can include preventive or corrective actions and are processed for review and disposition through the Perform Integrated Change Control process.

e. Project Management Plan Updates

Elements of the project management plan that may be updated include, but are not limited.

- **Cost performance baseline.** Changes to the cost performance baseline are incorporated in response to approved changes in scope, activity resources, or cost

estimates. In some cases, cost variances can be so severe that a revised cost baseline is needed to provide a reliable basis for performance measurement.

- **Cost management plan.**

f. Project Document Updates

Project documents that may be updated include, but are not limited to:

- Cost estimates, and
- Basis of estimates.

estimates. In some cases, cost variances can be so severe that a revised cost baseline is needed to provide a reliable basis for performance measurement.

- **Cost management plan.**

f. Project Document Updates

Project documents that may be updated include, but are not limited to:

- Cost estimates, and
- Basis of estimates.

CHAPTER SEVEN

CONSTRUCTION TENDERING PROCEDURES

7.0 INTRODUCTION

Tendering procedure is a mechanism whereby project consultants adopt such tested parameters like experience profile on a similar job to recommend contractors who would make the tender list for the execution of a particular contract. In construction industry today, most of the construction contracts are awarded through selective tendering mostly in the area of civil and heavy engineering projects. The contractors are evaluated and short listed by the client which could be Government or corporate organization. Selective tendering is limited to the number of contractors that are qualified to bid for the project. Contractors are given equal opportunity to tender for a contract and only qualified contractors with appropriate experience profile with motivated work force and reliable construction equipment are short listed to compete for award of construction contract, this way, non- performing construction companies are denied the opportunity to compete. Tendering Procedures can be explained as the overall methods under due process used by a contractor to arrive at a tender figure, (Onwusonye, 2002). "Construction Industry" is that industry that embraces a wide range of activities in both types and sizes of structure such as Docks, budges, buildings, airfields, canals

and a myriad towards serving mankind. (Onwusonye, 2002).Tendering procedures in Nigerian construction industry is that process of which a project consultant adopt such tested parameters like experience profile, financial stabilities, technical know-how, equipment and evidence of registration etc on a similar jobs to recommend contractors to tender for the execution of a particular construction work or project.

According to Cartridge (1988), many building and civil engineering contracts are awarded on the basis of invitation to tender. Invitations to tender consist of a public invitation extended to interested firms. Restricted invitation to tender are used exceptionally where the nature of importance or particular characteristics of the works so warrants, such invitation is issued only to those companies that the contracting authority decides to consult. Such invitation may follow a pre-selection procedure decided on a particular reference to the special nature or quality of the work to be done.

The decision to invite and select any contractor(s) for the award of contract for the erection and completion of any building or civil engineering project is carried out by the client(s) or their consultants. Some benchmark factors are used in considering the tenders such as; the size of the project, the nature of the project, the nature of the client, the location and purpose of the project as contracting firms are of different sizes, strength and experience. For example, it will be unsuitable and uneconomic

to invite or select Julius Berger Nigeria Plc to undertake a N5M building project at Owerri. Reasons: The size of this firm account for a high overhead costs and this will be a heavy burden for the project to accommodate. Furthermore, a small sized contracting firm with virtually no experience is not expected to bid for a multi-million building project complex.

7.1 TYPES OF TENDERING

- ***Open Tendering:*** This is one of the tendering methods by which the clients or their consultants select a contractor(s) with the appropriate experience and special knowledge to execute a contract. This type of tendering does not discriminate on size of firm, indigenous or expatriate company or firm, public organization consultancy etc. The advert may be through newspaper publication, radio or television channels.
- ***Selective Tendering:*** This is another method of tendering process whereby a selected number of firms are invited to submit tender for a given project.
- ***Turnkey Tendering:*** This is the process by which a client(s) invite a contractor or contractors to tender for a project proposal. The size of the project may require the contracting firm to design and built especially where the scope of work is not known to the client. The contractor may also be expected to fund the project under different financing arrangements.

- ***Package Deal Tendering:*** This is the process by which a client specially gives a written invitation to tender to a contractor firm on a project. The proposed project may be a specialized type that the firm is the only one that has the track record to execute. The client may not know what it takes to design nor can understand the design even when produced and no other firm has the requisite knowledge on that type of project. The client may shop around in most cases abroad for a competent firm to design and possibly construct and train the work force that will manage the project.
- ***Negotiated Tendering:*** This is a process by which tender can be given based on the agreement reached between the tendered and the client. It follows the nature of a package-deal tendering.
- ***Two- Stage Tendering:*** It is that method that gives the client or his consultant privilege to pre-select a contractor on the basis of experience and ability to do the work by detailed discussion with selected contractor on such topic as scope of the work and funding arrangements.
- ***Serial Tendering:*** This is a similar project that can be awarded to one contractor following selective tendering on a competitive basis on a master bill of quantity for the initial project.
- ***Cost Plus Tendering:*** This is the process in which the client appoint the architect and other consultants to prepare tender documents such as specification and contract drawings but the quantity surveyor will not prepare bill of Quantities rather, he will prepare (1) a

form of tender suitable for that project and,' (2) the schedule of basic rates of (i) labour (ii) materials for execution of minor or small contract works.

7.2 RULES GOVERNING PUBLICATION AND INFORMATION FOR TENDERS

A contracting authority wishing to award a contract by open tendering procedures or by restricted tendering procedures with pre-selection is expected to make known its intention by means of public notice. In an open tendering procedures, the notice of invitation to tender should state:

1. The subject of the contract in particular the nature and extent of the service to be provided and the general nature of the works. If the contract is subdivided into several phases the order and magnitude of the different phases and the possibility of tendering for one. Several or all of the phases and other information needed by firms to understand the purpose of the contact and the tender accordingly.

2. The final date for the receipt of the request for participant and the address to which they must be sent.

Furthermore and where appropriate the date for the issue of invitations to tender by the contracting firm. The information to be given in the request to participate in form of statement and document concerning authority requires firm to submit together with economic and technical conditions they must fulfill, If they wish to be considered in the selections. The notice of invitation to tender should set out details of the procedures.

7.3 QUALITATIVE CRITERIA FOR PARTICIPATION

Any company or more precisely construction firm offering a proof of compliance with the necessary legal, technical and financial requirement may participate in invitations to tender. In order to provide proof of his standing and ability, the tender must supply the following information.

I. References such as the most recent balance sheets giving proof of the financial resources available to him for performance of the contracts.

ii. A statement setting out his technical resource indicating work which he carried out or in execution of which he participated. He should attach to his statement any certificates relating to having access to his work activities.

iii. A statement indicating his labour force and equipment he intends to use and fulfill the contract. The amendment of tendering procedures takes place only;

a. if no tender is received which meet the conditions set out on the tender document.

b if the tender received has not satisfies the criteria for the award of contract.

c. if the economic, the technique and technical data of the project have been fundamentally altered.

d. if the tender received exceeds the financial resources budgeted for the contract execution.

e. if there has been no competition.

7.4 AWARD OF CONTRACT

The project consultant recommends to the contracting authority the most economically advantageous tendering process, taking into account the qualification and the guarantees offered by the tenders, the nature of the work and the conditions for executing the work and the price.

The contracting authority then informs the successful tenderer of the selection, before the expiry of the period lad down in the invitation to tender. Within the same time limit the contracting authority should notify the other tenderers that their tender is not successful. Their provisional deposit should be refunded to them. It is important to note that the contracting authority is not obliged to state reasons for its choice. A contract is deemed to be concluded when the tenderer receives notification that his tender has been approved. The letter of contract is delivered by the authority to the tenderer(s) notifying him that his tender has been approved. The letter is expected to contain the following;

a. A list of the contract document, together with their references in particular the general conditions, the special conditions and its annexes, the tender price schedule and the Bill of quantities containing the breakdown of the overall price.
b. The amount of the contract
c. All particulars necessary for determining the obligations arising from the contract document.

i. OPEN TENDERING

This type of tender is usually thrown open to all who wishes to

submit a tender, the advertisement is made in the press or radio and television which invite all interest contractors to come forward and collect tender documents, previously prescribed for the purpose of submitting quotations for a particular contract. Often times such advertisement can state categories of contractors expected to collect such tender documents the advertisement will also carry the following information:

1. Title of the project
2. Location of the project
3. Where tender document can be collect
4. The closing date for the submission of the tenders, time and place for such submission.
5. All other points mentioned under short-listing or qualification of contractors will collect the documents and will submitted their computed quotations prescribed. Then the tender will be opened the award will be made to the winner all as previously prescribed.

Open tendering has some advantages viz:

1. It give room for wide range of selection
2. It creates opportunity for unknown contractors to become known especially when he is successful.
3. It is an opportunity to get genuine tenders who are actually interested in the project.

The disadvantages include:

1. It wastes a lot of estimator's time, since only one tender will be chosen.

2. It involves excessive paper work as so many contractors will tender.

ii. SELECTIVE TENDERING

Selective tendering is one of the tendering instruments commonly used in most building and civil engineering contracts. Hughes (1978) opined that selected tendering aim at satisfying the client that he has got the best offer available.

In Nigeria construction industry, selection is exercised either by advertising for firms to indicate their interest (requiring them to supply particulars of their financial and technical capability in appropriate cases) and selecting a short list from those applying or sampling by selection from standing lists of investigated and approved firms and whose capabilities are known at least in general terms.

Generally, whether firms are directly or indirectly requested to declare their intention to tender, the maximum number of tenders finally selected are usually depended on the size and complexity of the contract and as recommended by (1997) code of selective tendering.

Selective tendering process allows a list of one or two reserve firms that may replace any of the originally selected firms who failed to accept the invitation. The following point may be considered when drawing a list of tenders.

1. The standard workmanship
2. The equipment such as plants
3. The degree to which the firms practice subletting of work.
4. The business record and standard code of conduct of workers,
5. The financial stability and length of time in business.
6. The capability available in relation to the firms current work load.

Advantages of Selective Tendering

a. There is certainty of performance and good workmanship.
b. It eradicate unnecessary waste of time, effort and reduces aggregates cost of tendering.
c. Tendering for award of contract period will be short in comparison with open tender due to the limited number of contractors involved.

Disadvantages of Selective Tendering

a. It is not open to all and only privileged few contractors are invited.
b. There is a possibility of ring information
c. It is often time associated with risk.
d. It is relatively competitive.

iii PACKAGE DEAL TENDERING

This is the type of tendering that is of a special nature, a complex like and such project is planned to be executed by one contractor, such contract is best let out on a package deal.

The client can give his brief to a contractor of his choice. He will invite the contractor to submit his proposal in terms of drawing specifications, cost and completion time. When such are submitted and he is satisfied that his requirements in terms of use, cost have been met, the award will be made and a formal agreement will be designed. This means that all the consultants works will be carried out by the contractor as well as constructing the project.

Alternatively, independent consultants may be appointed to supervise the post contract works.

Package deal has the following advantages:

1. It reduces cost of lithography
2. There is possibility of best workmanship
3. It makes possible the opportunity to receive contractor's contribution at the design stage.
4. Variations will be minimized with a consequential reduction in cost and time.

Package deal has the following Disadvantage:

1. When variations do occur they are usually very costly
2. Public accountability is usually in doubt as there may not be enough evidence to convince people as to the cost.
3. Contract sum usually high even if competition is adopted, it only restrain the tendency a little etc.

iv. NEGOTIATED TENDERING

This type of tendering can take various forms depending on the conveniences and wishes of the client as mentioned in the following three common varieties.

a. When a client has a big complex work to execute and the complex work is to be executed in phases such as a proposed research institute comprising:

- 4 3 story lecturer blocks
- 3 2 story laboratory blocks
- 1 2 story library
- 2 single ware houses
- 4 2 story duplex accommodation units.

The first phase comprises 1 lecturer block, 1 laboratory, 1 library, 1 warehouse and 1 accommodate unit. This first phase will be awarded based on open or selective tendering procedure. However, If the next phase of the project is to be commenced on time, selective tendering procedure will be adopted if the previously selected contractor performed very well in terms of workmanship and completion time in the first phase of the contract. It may be advisable to invite the contractor to negotiate the second phase since the units are similar. Such negotiation will be based on the current prices of labour and materials plus a percentage to be added for the contractor's overhead and profit. If an agreement can be reached on all the Bill items then the contractor takes the award. Subsequent phase will be treated in the like manner till the entire project is completed.

The client can appoint an architect and engineers to prepare drawing based on his brief. When all detailed or working drawings are completed he will appoint a project manager to negotiate the cost with a contractor of his choice. When a

reasonable cost is agreed together with a completion time, then the contractor takes the award and the formal agreement will be signed by both parties.

At times when the client is in a hurry and cannot wait for the usual time it takes to prepare tender documents, he will give this brief to the Architect and appoint all other consultants including Quantity surveyor and direct them to negotiate the cost with the project manager to choose a contractor of known capability with whom contract can be negotiated.

It is not a difficult task because estimate and schedule of rate can easily be produced by the Quantity Surveyor based on the preliminary drawing of the Architect and the Engineers. The contractor can move on to the site to commence work without delay. The Quantity surveyor will then prepare detailed Bill of Quantities as executed for payment purpose till the completion of all works and final account prepared.

Negotiation Tendering has the following Advantages:

1. Contractors can place order for their materials in advance which will minimize fluctuation on cost of materials.
2. There is possibility of best quality work
3. It reduces time spend on tendering procedures, save consultants time in terms of overhead cost.
4. There is savings on the normal quantum of paper works.

The Disadvantage:

1. There is less accountability as there may be little or no justifiable evidence to support the agreed sum.

v. TWO-STAGE TENDERING

This is employed when a client is very anxious that the project must commence on site without delay but with emphasis that cost must be minimal.

In such a situation the client will appoint his Architect. He will take the brief and will interpret it into outline proposal. All other consultants will be appointed. The contractors may be invited either through open or selective to collect tender documents previously described, except that the drawing will be preliminary drawings, and the Bill of Quantities will be dummy type. This dummy will contain item like the units of measurements without Quantities while a column is provided for the contractor to insert his rates. The contract will be awarded based on the fairness of the rates inserted against each item by the contractor and the basic price lists of labour, materials and the percentage quoted on schedules of day works. This constitutes the "first stage" or "first tier". After preparing working drawings by the Architect and Engineers to the contractor, the Quantity Surveyor will continue and complete the preparation of Bill of quantities. The rates or items which are in the measured Bill of Quantities (BOQ), will have to be worked out and agreed on by both parties for insertion in the measured Bill of Quantities. This measure will reflect the actual contract sum. It is then that the client and the contractor will sign a second contract agreement base on the contract sum, which is known as the "second stage" or "2nd tier".
The two- stage tendering have the follow.

Advantages;

1. The design may take into consideration expertise and equipment possessed by the chosen contractor.
2. The client can have his project commenced on site without delay.
3. Since design is done piecemeal, variations will be minimized or eliminated which reduces cost.
4. The client will realize his returns on the project or investment early as the project will be completed without delay.

The following are the Disadvantages of the two stage tendering.

1. There is a possibility of ring formation if selective method is adopted.
2. Cost of lithography will be high due to duplicated tendering. The contract sum is likely to be little higher if too many items are left out in the dummy bill.

vi. TURNKEY TENDERING

This type of tendering in most cases takes the form of Design, Built and Transfer (DBT) or Design, Built, Operate and Transfer (DBOT). The significant different between this and others is that the client does not fully finance the execution of the project, but starts repayment upon completion, or as it is often put when the keys are handed over to him. However, the client has got to provide quality contribution enough to satisfy the tender. This equity contribution can be between 10% - 20% of the total development budget. It varies between tenders. It

must be in form of cash plus landed property especially the plot on which type project is to be erected.

When the loan applied to the Banks, financial houses is approved, the following are the common terms of agreement.

1. Period of repayment of such loan; which is usually 20 years.
2. Moratorium period, (i.e. period of grace before repayment starts). Normally, it used to be between 2 or 3 years. Such period will normally cover the period of construction.
3. Interest on such loan is very minimal.

Turnkey tendering have the following: Advantages;

a. Variations can be eliminated or minimized.
b. The client can realize his dream project with little financial contribution.
c. There is possibility of best workmanship since one of the best contractors will execute the project.
d. Contractor of good financial stability will always remain in business even during period of economic recession.

Disadvantages;

a. If there is bad management, the project may never pay.
b. The cost goes higher still considering the emission rate.

vii. SERIAL TENDERING

A number of similar projects can be awarded to one contractor following selective tendering on a competitive basis on a master Bill of Quantities for the initial project.

The priced Bill of Quantities then form the basis of a standing offer which is open to the client for a series of contracts. Contracts are awarded separately on the basis of the master priced document and cost are updated to take into account fluctuations in cost subsequent to the initial award, serial tenders are usually used when a series of contractors are linked to pre-determined start and finishing dates, this enable continuity of work for the contractor and collaboration between designers and contractor.

7.5 TECHNICAL QUALIFICATION

Terms of reference for technical proposals generally specify the categories of information the contractor is required to provide and the sequence in which the information is to be presented. The structure models for technical proposal could be as follows:

- ***Cover:*** The information to be provided on the covers should be in the following order of importance.

a. The identity of the contractor
b. The subject of the proposal.
c. The submission date of the proposal.

- ***Letter of Transmitter:*** This letter is a counter part of the employee's letter of invitation and should be addressed to the person who signed that letter. It has the following main function:

a. To draw the client attention to the fact that the technical proposal is more than or that is accomplished by a financial proposal submitted under separate cover.
b. To sign the key message or salient features that makes the proposal different and better.

- ***Project Understanding Appreciation or Overview:*** This project understanding section must contain comments by the contractor by the terms of reference of specification with emphasis on.

a. Any point in the definition of the problem, scope of work, technical requirements, project facilities, time scale and other items, which have had a particular formative influence on the contractor responses.

b. Indication of any alternative approaches which analysis of the brief or discussions with the client may have suggested as feasible and acceptable.

c. Outline of any additional areas of works or supporting activities which the contract is able to provide if required.

Finally, the technical bid section must contain comments on:

i. Technical methods to be adopted and work programme.

ii. Project management and logistics

iii. Curriculum of vitae of team members' emphasis on categories summary of experience of comparable projects performance as regards effectiveness, profitability, risk and internally liquidity (solvency) ratios are intended to indicate the ability of the firm to meet future short term financial obligation.

The idea is to match the potential obligations. Liquidity measure is the current ratio which examines the relationship between current assets and current liabilities.

The ratio that indicates how well the management is operating the business is typically into two sub-categories:

i. Efficiency ratio

ii. Profitability ratio

The efficiency ratios examine how the management uses its assets and capital which mainly measured terms of the volume of cash generated by various asset categories.

The profitability ratio analyses the profit that can be on the scales and also on the assets and capital employed.

Given that profit margin equals to net scales minutes the cost of goods sold, this ratio indicates the basic cost structure of the firm.

$$\text{Opening profit margin} = \frac{\text{Operating profit}}{\text{Net scales}}$$

The viability of this profit through overtime is an indicator of the business risk for a firm.

7.6 FINANCIAL PROPOSAL

The content of the financial proposal is primarily on the type of contract to be used for project. The key guideline to follow in every financial proposal is thus:

a. Recognition that getting the price is at least as important as making the right technical bid. Quality with the lowest price as sharply competitive as is possible so that their bid submission could be perceived as better value for money than the rest of the short list.

b. Think in terms of the price client is prepared to pay for the right product rather than the price at which the contractor

will sell. This can be achieved by finding solutions to the following questions:

i. What is the value of the work to the client?

ii. What evidence do we have about the client's perception of value for money in our sector of construction?

iii. Try to minimize your exposure to financial risk. This is particularly important in estimating for project that involves long term or large scale commitment of material and equipment. Risk may include cost escalation as a result of inflation from other organization that are currently using your services or which engage you in the past, in order to obtain assessment of your performance and also on indication of whether they would use you again on similar work. Price is part of the equation but alongside it, there are factors such as; performance, quality of analysis, reliability and professionalism to be taken into account. Most clients appreciate the fact that in working with the contractors, they get what they pay for and that contractor who offer service at price cut to them may be offering also low quality, poor commitment and inexperienced staff. These factors represent contingencies whose inputs are difficult to calculate but which are often critical to the financial outcome of any project.

7.7 TECHNICAL PROPOSAL

The following broad questions form the basis for assessing technical proposal.

a. Does the contractor really understand the client's needs and priorities? Is there an insight into the heart of the matter?

b. Is the contractor response just confirming our own ideas or showing us something new?

c. Is there evidence of genuine commitments and involvement or does the proposal submitted by the contractor read like a routine exercise.

d. Will the client get what he is paying for? Do the method, personnel, programme or work and proposed management arrangement meet the client's objectives for the projects? Are they serviceable and realistic input of time and effort, and is this likely to deliver results on targets?

e. Does the contracting firm and individual team personnel have a convincing record of experience?

f. Does the contractor offer a practical and businesslike approach to get the work done?

g. Is the contractor specific about the availability of key personnel, scheduling of input and delivery or output? Is it clear exactly on who is going to do the work?

Finally, technical proposals are graded on each set of contracts and their overall can be a 5 point scale as follows:

- Very high standard with no reservation at all about acceptability
- High standard but falls just short of A
- Good standard, acceptable with minor reservation.
- Acceptable but there are significant reservation but not

sufficient to warrant actions.

- Not acceptable

a. The qualification and competence of the personnel proposal for the assignment which usually carry a weighing of 50 60%.

b. The adequacy of the proposed work performance and technical approach in responding to the terms of reference carries a weighing of 30 40%.

c. The general experience of the contractor in the field of the assignment with a 10 20% weighing.

Personnel are assessed from an examination of their curriculum vitae to which criteria are applied.

a. The professional adequacy for the project and suitability to perform the task assign to them carrying a weighing 30 50% of the points for this category.

b. Their general qualifications in terms of length of experience, responsibilities, education, training is 25 30% weighting.

c. Their language capability and professional experience, in the region and in comparable project locations 15 20% weighing the competence suitability and experience of the persons nominated as project manager is critical in the qualification process.

In some cases, half of the total evaluation points may depend on the curriculum vitae of the project manager. So, for an adequacy of the proposed work programme, points are normally awarded to the following criteria.

a. Appropriateness of the methodology and work schedule 30% of the points for this category.
b. Response to all this items and issues raised in terms of references 30% of points.
c. General presentation 10% points.

7.8 EVALUATING PROPOSALS

Some clients adopt a practice of having proposal skimmed over quickly to overall ideal of this quality before subjecting them to more thorough examination.

Firstly, impression gained in this way can be decisive and this is a further reason why contractors have to make sure that their proposals can be seen immediately to be organized, efficient, structured logically and presented in a competent professional manner. Clients will be concerned principally with the standard of response to the brief and extent to which contractor fulfilled the requirements set by the terms of references.

7. 9 EXPERIENCE OF RECORD

The curriculum vitae of project team members and categorize summaries of experience on comparable project and another relevant assignment constitutes the experiences record of the contracting firm. Whereas curriculum vitae focuses on the experiences of the individual staff project summaries or description are the means of presenting the experience of the contracting firm seeking to be pre-qualified for a project.

Experience profile of a contracting firm can be categorized into the following groups.

a. Relevant
b. Recent
c. Relate to the specific assignment.

It is important to know that the experience of a contracting firm resides primarily in the people who perform the work. The process of developing project summary must include the following information.

a. Name of client and identity of project manager responsible for the work.
b. Contract details
c. Outline of the assignment and comment on its degree of success in achieving the client's objectives.
d. List of service provided
e. State completion dates
f. Names of other sub-contracting firms or external consultant associated with the project.

Whereas a project involves more than one field or expertise it is useful to have more so that one project summary, the factual backs many remains the same but different aspect of the work can be brought into prominence in each version to suit the emphasis of the proposal, project summaries need to be maintained and kept up to date as the same as curriculum vitae.

7.10 CATEGORISING PROJECT

The Federal Government and State Government categories the registration based on the contract value of project. As such, it is the categories that he will be qualified to tender for. These categories of the Federal Government are four viz: A, B, C, D whereas those of the State Government are six viz; A, B, C, D, E, F. these are explained in the following tables:

Table 7.0 Categories of Projects

A. I

Category	*Contract Value*
A	Not exceeding N20,000.00
B	Up to N200,000.00
C	Not exceeding N2 million
D	Over N2 million

B. State Government Registration

Category	*Contract Value*
A	N5,000.00 – 25,000.00
B	25,000.00 – 50,000
C	50,000.00 – 100,000.00
D	100,000.00 – 200,000.00
E	200,000.00 – 500,000.00
F	500,000.00 and above

The contractor must produce Photostat copy of the appropriate category registration before he can collect the tender documents.

Also, project summaries should be structure into categories of experience with direct relevant to the proposal. The basic principle of writing project summaries is as follows:

a. Adopt a narrative focusing on the closeness of match between the technical requirement assignment and results achieved in your previous and current projects.

b. Do not leave client to draw conclusion about the value of your experience make the point yourself directly and commonly. Clients may wish to seek reference.

7.11 DEVELOPING THE PROPOSAL STRUCTURE

Respondents to short listing exercise are expected to set out a draft structure in the form of a list indicating the little and component part of each section. The structure may change as the proposal begins to take shape the important point is to have provisional frame work on which to organize the material.

The following techniques can be adopted while writing and editing proposals.

a. Identify the purpose of each of the text and state this clearly at the outset.

b. Define the logical structure at the start and use the structure as basis to organize the materials.

c. Check the competence and consistency of the proposal by including all the points clients will need to know.

d. Sign post the start of each section; from the opening paragraph the client mind should be able to see where the text is leading and how it relates to what proceeds the opening statement, is all important as the framing make the reader to read on.

e. Every statement must play its own part in reinforcing the logic of the text.

f. Do not try to blind the client unexplained.

7.12 ADVICE ON PROPOSAL EDITING

The proposal editor must make sure he really understood what the technical expert is saying; proposal editing being a matter of translation must not deprive the text of technical precision.

CHAPTER EIGHT

SOURCES OF PROJECT FINANCE

8.0 INTRODUCTION

Real estate finance can be looked at, as the fund needed to carry out real estate development and other related operations. It is an essential ingredient in modern day real estate development and most large-scale development would not take their present scale without substantial credit. Finance constitutes a fundamental centerpiece in any real estate development. The ability of a developer to mobilize enough funds for the project determines largely, the success of the project. Finance is seen as an all-important factor, a very crucial ingredient to project to project success, and basically the fulcrum, which sustains the lever for development projects. The process of sourcing project finance, alternative funding arrangements and funding institutions in Nigeria are major problems that constraint mobilization of funds for real estate in a developing economy. Ogedemgbe et al, (2003) observed that the economic situation in the country over the years had influenced the availability of funds for real estate development. The performance of any project finance system will depend primarily on the volume and nature of fund within the economy and proportion of it that can be sourced, mobilized or even dedicated/ channeled towards real estate development. As a result of the huge capital

outlay needed for real estate development, developers usually source for fund in order to complement their equity capital. Large developers will usually have multiple funding arrangements with a variety of financial agencies. Nevertheless, the field is becoming so complex and competitive that effective project management is increasingly concerned with the way in which control over a particular scheme will be influenced by the origin and nature of development finance. There are many sources of finance for real property investment which may either be internal or external. A source of finance is said to be internal when it is an internally generated fund in the form of estate income. Rental incomes from properties are in this group. This source of finance is most often called equity fund/capital. Sources of real estate finance external to the estate commodity include operator's equity capital, loan, consociate and adventitious wealth.

Traditional funding of real estate is either by equity funding (Equity funds), loan capital (Debt Funds) or a combination of both. The well established and tested methods of funding real estate are as follows:

- Equity capital
- Loan capital
- Mortgage lending
- Debenture
- Contractor financing
- BOT (Built Operate and Transfer)
- DBOT (Design, Built, Operate and Transfer)

development, investment and non-investment developments. It is used in preparing documents for land registration and obtaining development permit, most building design and costing is done with equity funds. Appraisal reports that in most cases serve as an instrument to facilitate loan syndication is carried out with equity funds. Documents for contract biding and other tendering processes are only possible with equity funds. The challenges faced with equity funds is the level of capital required in some activities of the conception and planning phases like "the environmental impact assessment analysis required for public projects viability determination". How to determine financial returns to an equity funds. Should we use the same criteria of analyzing returns on investment projects in that of equity funds?

ii. Debt Finance

Because of the colossal amount of money which real estate development projects require, debt funds also known as loan capital, are often necessary to supplement equity capital in order to successfully and timely complete the project (Egolum, 2003). Debt funds are the loans got directly from the various lenders such as banks and other financial institutions for a specific period. They are classified according to their duration, short, medium and long terms. Thus, we have short, medium, and long term loans.

(a) Short Term Loans: The conventional method of raising funds for the acquisition of land and the subsequent development of potential investment property over a two to three year period is by way of short-term finance. The

traditional sources of short-term finance are the commercial and merchant banks as well as finance houses. The terms on which these loans are provided are usually very stringent and the interests charged are usually on variable interest basis and 2 percent to 6 percent above basic rate. One advantage of loans in commercial banks is that a substantial proportion tends to mature, within 1-5 years. One of the challenges of debt-finance is that most times, the forms of collateral security demanded by the banks are not quite satisfactory and prospective borrowers are deterred by these rather inflexible demands. Merchant banks too have the same maturity pattern as commercial banks but are even more concerned with liquidity. In an effort to mobilize funds into residential housing sector, commercial and merchant banks were directed by the central bank of Nigeria to treat the residential sector as a preferred sector and allocate at least 7 percent of their loanable funds into the sector. The guidelines further stipulated that where the total housing loans granted by the banks in any given year is lower than the level prescribed by the central bank, the short fall will be taken from the banks and on lend through the central bank to the federal mortgage bank. Loans for residential building construction were for a minimum period of 15 years. However, these guidelines have not been strictly complied with as the banks are structured to accommodate comfortably short term lending. Property companies also provide short-term loans to developers.

(B) Medium Term Loans: These are loans granted for periods not exceeding 10 years. They are normally obtained by direct loan or overdraft from the commercial banks. Such loans are frequently raised while arrangements are being made

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(B) Medium Term Loans: These are loans granted for periods not exceeding 10 years. They are normally obtained by direct loan or overdraft from the commercial banks. Such loans are frequently raised while arrangements are being made

for long-term loans. The banks are free to lend to whom they choose. Loans are repaid in a lump sum or by arrangement, and are subject to recall by the bank at anytime.

(c) ***Long Term Financing:*** Long-term development finance as its name implies is finance that is redeemable within 20 to 30 years or even more and usually at a relatively lower rate of interest. The greater equity participation providers in Nigeria are the Federal Mortgage Bank of Nigeria, various states' property Development Corporation and Insurance and Assurance Companies etc. Their lending activities are concentrated mainly in the residential housing sector. Long-term development finance has traditionally been raised either by mortgage or particularly in terms of credit squeeze by sale and leaseback. Egolum (2003) described sales and leaseback as one of the means of raising equity funds particularly during the hard economic times. Sales and leaseback is an arrangement whereby the owner-occupier of a freehold or leasehold property sells his interest in the property to a purchaser (usually an institutional purchaser) on the grounds and understanding that the property is granted back to him on a lease at a rent which may represent an investment rate of return on the capital (i.e., the purchase price). The seller would by this arrangement avail himself huge sum of investment capital for carrying on his desired project development or business while at the same time retaining the use and occupation of the property he had sold at a paltry annual rental value.

iii. Mortgage Loans

Mortgage loan is one of the chief sources of debt finance through which banks and other financial institutions fund real estate development projects. A mortgage loan involves the transfer of an interest in property as a security for loan; the transfer of title to another which is made to secure the performance of some act such as payment of money by the person making the transfer. Upon the performance of the act, the grantee (usually a financial institution) agrees to convey the property back to the borrower. A mortgage financial institution is a corporate body established legally to provide mortgage finances or engage in mortgage financial transactions to the public (Emoh and Nwachukwu, 2011). A mortgage financial institution can be a mortgage bank or any other financial organization or outfit directly involved in mortgage financial transactions. The Federal Mortgage Bank of Nigeria (FMBN) and the numerous Primary Mortgage Institutions (PMIs) in Nigeria are examples of mortgage financial institutions.

8.1.1 Development of Mortgage Finance System in Nigeria

Mortgage banking development in Nigeria can be traced to the establishment of the Nigeria Building Society (NBS) in 1956 as a retail mortgage outfit. According to Ahmed (2006), it was a joint British/ Nigeria venture but collapsed in the early seventies due to inability to perform its statutory functions. This led to the birth of the Federal Mortgage Bank of Nigeria (FMBN) in 1977 as a Federal Government fully-owned bank under Decree No. 7 of 1977 following the dissolution of the

NBS whole assets. The FMBN was created essentially to serve as a wholesale and apex housing finance institution in Nigeria under the Act. Other institutions created with the responsibilities to serve as housing finance were created through Decree 53 of 1989 (now Act). They include the Primary Mortgage Institutions (PMIs) such as Building Societies, Housing Associations and Credit Unions. Among the major responsibilities of the FMBN are:

- the provision of long-term credit facilities to mortgage institutions in the country
- encouragement and promotion of development of mortgage institutions at state and national levels
- supervision and control of the activities of mortgage institutions
- mobilization of savings particularly through the National Housing Fund
- promotion of investment in the manufacturing of building materials
- promotion of research on construction and mortgage finance.

The role of the FMBN has also been expanded to back the mortgage finance market with the capital market and develop the viable secondary mortgage market and to mobilise foreign funds into the housing finance sub-sector. The shortcomings of the FMBN operation must have led to the re-examination of National Housing Policy and the establishment of the National Housing Fund; the two policy instruments of government aimed at enhancing housing delivery in Nigeria. The National Housing

Policy also led to establishment of Primary Mortgage Institutions (PMIs) in Nigeria. Unfortunately within less than five years of the taking off of PMIs, most of their operations were confronted with problems which resulted into the situation whereby most of the PMIs have their offices closed. One of the major achievements of the National Housing Policy is its institutional reform which resulted in the establishment of a two-tier formal housing finance system following the promulgation of the Mortgage Institution Act. Under this arrangement the FMBN was restricted as the country's apex mortgage institution with a supervisory role over a network of PMIs. The PMIs are to serve as secondary housing finance institutions. Under the arrangement, the FMBN ceases operation as retail housing finance institution. This role is to be performed by the PMIs. The role of FMBN henceforth remains as the apex and regulatory body. To perform these functions the FMBN was re-organized into three divisions as follows:

- The National Housing Fund Division charged with the responsibility for the arrangement of the National Housing Fund.
- The Regulatory and Inspectorate Division charged with responsibility of monitoring and regulating housing finance sector operations and;
- Corporate Service Division to provide administrative, accounting and management information services to the core divisions.

Despite all these divisions, there are many contributory factors responsible for the poor state of affairs in housing development

as far as the performance of the National Housing Fund Scheme is concerned and they include:

1. The stringent terms and conditionality's for obtaining the National Housing Fund loans.
2. Improper documentation and processing of the NHF mortgage loan applications of the prospective borrowers by the Primary mortgage Institutions (PMIs).

Emoh and Nwachukwu (2011) stated that potential borrowers have no access to land due to the difficulties in obtaining legally recognized title document as security for mortgage lending and meeting other requirement of the Land use Act of 1978. Other contributory factors include:

- ❖ Use of block of existing mortgages as security requirement for the Primary Mortgage Institutions that want to apply for the National Housing Fund loans.
- ❖ Lack of public awareness of the NHF scheme and its modus operandi.
- ❖ Low income of workers who are contributors to NHF scheme.
- ❖ High cost of building materials and construction which are not conducive to the growth of mortgage lending and less so for the affordability of the low and moderate income groups.

8.1.2 Functions of Primary Mortgage Institutions (PMIs)

The basic functions of the PMI's as stated in the official guidelines of the FMBN are as follows:

i. To ensure equitable distribution of mortgage lending activities all over the country.
ii. To operate as efficient and effective mortgage institutions.
iii. To dictate the level and pace of growth industry and minimize avoidable fraudulent loses of PMIs.
iv. To ensure timely and adequate loan performance in order to create opportunity for structure expansion in the provision of housing finance.

Based on the report released by the Central Bank (2003), out of about 350 PMIs licensed, only 81 are presently declared healthy. To enhance deposit mobilization, many PMIs developed attractive products in addition to the National Housing Fund such as social loan, economic loan, commercial loan, mortgage administration deposits, institutional deposits, and children savings among others.

8.1.3 Commercial Banks as Real Estate Financiers

The commercial banks form an important source by which many investors get funds to finance real property projects. Commercial banks are money creating financial institutions that perform three major functions, namely, acceptance of deposits, granting of loans and operators of the payments and settlements mechanism. Commercial banks obtain their funds from two main sources:

a. Capital and Reserves A bank's capital includes Debentures and capital stock, while the reserves include undistributed profits and surplus.

Debentures are long-term debt instruments or securities issued by banks in order to increase their capital. They represent debt not ownership; the debentures are specifically a subordinated debt. In the event of bank liquidation, debentures would be paid off only if and when all depositors had been paid in full. Hence, debenture bonds provide a cushion of protection for other creditors, just as the other capital accounts do.

Capital stock consists of one or more issues of preferred stocks and sometimes more than one class of common stock. Commercial banks traditionally have been financed by common stock only, of a single class. This is not only the simplest; it is also the most conservative capitalization possible.

b. Deposits A bank's deposits are the amounts that it owes to its customers. Most individuals whom the banks owe at any particular moment will be individuals who have brought some sort of money to the bank. These money then belong to the bank which may use them in any way it wishes as a basis for lending or for paying current expenses or as a pool of idle funds (Emoh and Nwachukwu, 2011). Bankers are eager to attract new deposits because of the addition to reserves and the increase in lending power that will result. Deposits provide the working capital; the stock in trade of banking. No commercial bank can really operate effectively and successfully without adequate deposits.

There are different types of deposits accounts facilities offered by commercial banks and these include:

1. Time Deposits

2. Savings Accounts Deposits
3. Demand Deposits or Current Account Deposits.

The structure of these deposits plays an important role in the operations of a commercial bank. For instance, the more the time deposits, the better the bank is placed to undertake term lending. Because bank deposits are generally and theoretically repayable on demand or at short notice, banks prefer to have their lending on correspondingly short-term. The need therefore, for commercial banks to maintain high liquidity ratio makes it necessary for them to lend mostly for short-term purposes. Commercial banks not only have short-term preferences but price their mortgages beyond the socio-economic realities of the majority. Historically, the degree of involvement of these banks in mortgage finance responded more to the Central Bank Credit Guidelines than the portfolio advantages associated with mortgages. That is why mortgages have continuously declined in their portfolios since housing was removed from the preferred sector in 1986. Adegbenjo (2000) stated that banks and other financial institutions cannot grant very long-term credit facilities because of the nature of their operation, which places inhibiting factors on them in that regard. These factors include, among others the following:

1. The need to meet with the cash withdrawal needs of their customers/depositors at short notice.
2. Central Bank's regulation requiring them to maintain a stipulated ratio of their total deposits as cash reserve with it.

3. They are precluded from directly investing in real estate projects except for the purposes of running their own business or accommodating their staff.

For adequate liquidity purposes occasioned by the nature of their business, they can only offer short term loans and advances that attract high interest rates which is inconsistent with investing or funding long term projects like property acquisition and real estate development. The fact that their mandate is mainly for funding trade and commerce, with more specialized financial agencies such as the Federal Mortgage bank of Nigeria and Primary Mortgage Institutions being more suitable for real estate and project financing. Most commercial banks give loans for commercial property development and residential housing loan schemes, however, they are more interested in the commercial sector.

iv. Contractor Financing

The contractor financing is in the form of long-term capital provided by the contractor for the development or redevelopment of a piece of property. It is a device whereby the contractor (i.e. a real estate development company) undertakes in the building contract agreement, to execute the building construction in line with the approved building plan and to be paid after certain stages or on completion of the development (Egolum, 2003).This type of arrangement frequently arises when the property owner is not in a position to raise enough capital for the development or redevelopment of the property

and as such favours an investor who does not have immediate colossal amount of money which building construction gulps, and still secure the development of his land. The arrangement is such that the contractor has the right to still retain the control of the property until he is completely reimbursed of the agreed cost of development. Emoh and Nwachukwu (2011) are of the opinion that this type of finance is popularly used in most urban towns in states such as Onitsha, Awka and Enugu. The property to be developed or redeveloped is usually strategically located in prime commercial and residential areas as to command very high value when developed. This method of real property finance has however, presented some problems in actual usage. Problems frequently, encountered range from the assessment of the extent of work to be performed by the contractor to things like costing of the work, appreciation in value of the property over the years, basis of sharing property income, responsibility for the various outgoings and management of the property.

v. Built Operate and Transfer (BOT)

An individual, corporate body like banks or an organization concerned with real estate development could be attracted by a good appraisal report to finance a real estate development that is commercially viable with the agreement to operate or manage the investment to recoup his capital expenditure and interest within a specified period of time. In this situation, every other logistics must have been put in place to allow execution process. This means that land for the project has been acquired, legal instruments to build have been obtained and registration

of titles completed. This arrangement can apply in the financing of multiple residential, offices, shopping malls, university and other manageable hostel accommodations, hotels and hospitals etc. Some of the challenges include; change in the administration of the clients organization or death in case of private individual and that of the financing organization, whether the property state of repairs could attract revenue that will compensate the developers interest in the investment for the remaining life of the property, Security challenges like kidnapping, militant groups or war that could obstruct development process with time either at the building stage or management stage, natural and other environmental challenges that can obstruct the smooth execution of such contract agreements and how both parties could be repositioned to reduce the risk of total lost.

vii. Design Built Operate and Transfer (DBOT)

In this case, the only major difference between BOT and DBOT is while BOT applies mostly at the execution phase of a project life cycle, DBOT can apply from the conception phase. The contracting firm will be expected to design the project and convince the client with a good appraisal on the viability of the project and if accepted by the client, they can go on to execute with BOT contract implications. In BOT the design is done by the client. This type of financing arrangement is common with public sector for most turnkey projects, especially when the scope of the investment is beyond the technology capability of the client. The contract starting from the conception does not

mean that some logistics like provision of land and its registration and providing security for the contract will not be done by the client. Some of the challenges of BOT is still the same with DBOT except that the appraisal report may not contain other challenges that could be encountered in a longer run when the property is transferred to the client.

ix. Private Public Partnership (PPP)

In a PPP contract arrangement, some or all phases of the project life cycle could be executed in good partnership arrangement between a private entity and a public interest. In most developing economies, housing the populace is very difficult because of the expected huge amount required in real estate projects. Most governments and various arms of government bodies and agencies use partnership option to meet up with real estate deficiencies. Many real estate projects are being financed in Nigeria with this PPP financing option. This option is facing many researchable challenges that are beyond the scope of this work. Some of the challenges of BOT, DBOT is still prevailing in PPP contract arrangements.

8.2 CHALLENGES OF ACCESSING HOUSING FINANCE IN NIGERIA

The most serious problem affecting the real estate investment market in Nigeria is scarcity of development funds. The Nigerian housing sector has an affordability challenge. Housing delivery is targeted mainly at the middle and high income segment of the population that can either pay cash or

access mortgage finance from the banks. The non-availability of long-term funding for housing development also compels builders of residential accommodation to recover their capital within the shortest possible time. Another important aspect of the challenges of housing finance is its dependence on the propensity to save. This is attributed to the fact that investment in housing, like in any other sector, has an opportunity cost. Such cost is the return on the alternative form of investment and unless until the return to housing investment is commensurate with or better than investment in other sector, there will be no significant in-flow of investible funds to housing (Agbola 1998, Diogu 2004). Anota (2008) agreed that the potential of the housing sector are grossly underdeveloped in Nigeria. This is due to obvious inherent deficiencies in the housing finance system. Akomolede (2007) identify the absence of thriving and sound mortgage system as a contributory factor. He opined that Nigerians, both as property developer or house buyer, do not have any other choice other than to take loans from commercial banks. Despite the unattractiveness and non-suitability of such loans, stiff conditions still need to be met before advancement.

There are many other constraints facing real estate development investment in Nigeria. Lemo (2007) observed that the production and supply of real estate investment continues to be constrained due to the under listed:

1. Problematic land administration.
2. Poor infrastructural facilities such as road, electricity and water.
3. Lack of long term finance for construction and mortgage finance.

4. High inflation and interest rate.
5. Low income/poor earning power of the citizenry.
6. Low saving culture due to the absence of suitable savings mobilization mechanism. Consequently he concluded that affordable shelter is inadequate and adequate shelter is unaffordable. While Anota (2008) agreed with Lemo (2007), he lamented the paucity of mortgage properties in the building market. Financial intermediation for housing is dismally low to such an extent that the ratio of mortgage loans and advances by banks to their overall portfolio stagnates at single digit percentage. Faleti (2007) advocates the removal of legal framework complexities so as to remove the roadblocks to foreclose asset recovery. Absence of sustainable long term funds which is required for construction is the albatross of the mortgage system. The structure of bank deposit liabilities is "preponderantly short term". It is due to the fact that these banks are not ready to bear the risk of mismatching short term deposit to fund mortgage concerns. Akomolede (2007) puts it clearly that the period for the repayment of mortgage loans in Nigeria is between fifteen to thirty years (15 30years). He however observed that there are some idle funds in term of minimum deposit that cannot be withdrawn in all the banks which can be assessed. Faleti (2007) disagreed with this submission because of the cumbersome legal framework. Inability of the banks to recover collateral weakens the value of such. This also creates liquidity risk for banks between payment default and collateral liquidation. The requirement of Governor's consent through the issuance of certificate of occupancy because of the Land Use Decree of 1978 lengthens

the home loan processing time and slows down ownership confirmation. The cost of stamp duties, transfer duties and various taxes and levies make transaction cost too high to the low and medium income earners. The inefficient wage system and income distribution structure makes it difficult for prospective house buyers or developer to pay obtained loan back under short term arrangement. Job insecurity has rendered the private sector redundant and non-viable in such that no bank could afford to grant loan to the sector with the hope of paying back through salaries and wages. Though organized private sector, corporate bodies, registered companies are being addressed gradually, it is of high risk to deal with the unorganized private sectors such as artisans, sole business owners who are employers of labour.

8.3 RECOMMENDATIONS ON FUNDING STRATEGIES

In order to remedy the problem of shortage of finance for real estate investments, all the stake holders such as the government and its agencies, financial institutions, private and corporate investors have special roles to play.

The following recommendations are suggested:

1. The primary mortgage institutions should be strategically repositioned and strengthened to serve as a vehicle for housing delivery.
2. The secondary mortgage market should be effectively developed and linked with the capital market to make housing finance accessible to the larger population as means of economic empowerment.

3. Rural housing programme should be promoted through market support incentives and local materials development. Cash crops such as cocoa, cotton and palm oil can become part of collateral securities in the rural setting for low income housing units.

4. The major problem with commercial loans is the interest rate. Government should evolve policies that will make banks grant loans for housing at a special interest rate not more than 5% per annum. Budgetary allocation should be made to finance housing just like it is done for health, education and other sectors of the economy. All accrued monies from sales of federal houses should be handed over to the secondary mortgage institution so as to redirect such into housing development.

5. The government should encourage the financial institutions by allowing them to determine competitive lending rate for property development and by decontrolling rents so as to permit investors who borrow to build to earn sufficient income to repay their loans.

6. The National Housing Fund (NHF) scheme needs updating and amendment where necessary. If this laudable idea is complied with by all, it will provide easier means of fund to property developers.

CHAPTER NINE

CONSTRUCTION EQUIPMENT AND PLANT

9.0 INTRODUCTION

Construction plant and equipment refers to the tools, instruments, machinery, and other mechanical implements required in the performance of construction work. Construction plant is defined as concrete batch plants, aggregate processing plants, conveying systems, and any other processing plants which are erected in place at the job site and are essentially stationary or fixed in place. Equipment is defined as items, which are portable or mobile, ranging from small hand tools through tractors, cranes, and trucks. For estimating purposes, plant and equipment are grouped together as equipment costs.

9.1 SELECTION OF EQUIPMENT

An important consideration in the preparation of an estimate is the selection of the proper equipment to perform the required tasks. The cost engineer should carefully consider number, size, and function of equipment to arrive at optimum equipment usage. Some factors to consider during the selection process are: conformance to specification requirements; job progress schedule (production rate); magnitude of the job; type of materials; availability of space; mobility and availability of

equipment; suitability of equipment for other uses; equipment capabilities; number of shifts; distances material must be moved; steepness and direction of grades; weather conditions; hauling restrictions; standby time; and mobilization and demobilization costs.

The cost engineer preparing the estimate must be familiar with construction equipment and job-site conditions. The equipment selected should conform to contract requirements and be suitable for the materials to be handled and conditions that will exist on the project.

9.2 ESTIMATING METHODOLOGY

The "crew concept" for construction cost estimates requiring detailed estimating of labor, materials, and equipment is to also be considered in costing equipment. For each significant work task, workers and equipment are expressed in the hourly cost and expected production rate. Where a major piece of equipment serves more than one crew, the total equipment time should be prorated between both crews.

9.3 PRODUCTION RATE

After determining the type of equipment to be employed, the cost engineer should select the specific equipment size which has a production rate suited to the efficient and economical performance of the work. The size and number of units required will be influenced by equipment production rate, job size,

availability of space for equipment operations, the project construction schedule for the various work tasks, number of shifts to be worked and the availability of equipment operators. Emphasis must be placed on the importance of establishing a reasonable production rate. Production may be based on actual performance data, commercial manufacturer tables or rates from historical equipment models and assemblies, adjusted for project conditions.

9.4 MOBILIZATION AND DEMOBILIZATION

Mobilization costs for equipment include the cost of loading at the contractor's yard, transportation cost from the yard to the construction site, including permits, unloading at the site, necessary assembly and testing, and standby costs during mobilization and demobilization. Trucks for the project capable of highway movement are usually driven to the site and are often used to transport minor items. All labor, equipment, and supply costs required to mobilize the equipment should also be included in the mobilization cost. When the equipment location is unknown, the mobilization and demobilization distance should be based on a circular area around the project site, which will include a reasonable number of qualified bidders. Demobilization costs should be based on that portion of the equipment that would be expected to be returned to the contractor's storage yard and may be expressed as a percentage of mobilization costs. All labor, equipment, and supply costs required for cleaning/preparing the equipment so that it is in the same condition as it was when it arrived at the site should also be included in the demobilization cost. Transporting rates

should be obtained periodically from qualified firms normally engaged in that type work

Mobilization and demobilization costs for plant should be based on the delivered cost of the item, plus erection, taxes, and dismantling costs minus salvage value at the end of the project. Maintenance and repair are operating costs and should be distributed throughout the period for the work accomplishment.

9.5 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE COST RATES

The Construction Equipment Ownership and Operating Expense determines the hourly rates for equipment ownership and operating expense. These rates are also included in the Cost Book and will be used in the preparation of all cost estimates for owned equipment. These pamphlets have been developed for different geographic regions in the United States, and the appropriate pamphlet or Cost Book should be used based upon project location. Rented and leased equipment is appropriate for inclusion in the estimate at competitive rates if judgment determines this to be a reasonable approach by a prudent contractor. The cost engineer may also use current commercially available publications for assistance in determination of rates.

9.6 PLANT COST

In cases of highly specialized plant, 100 percent write-off of the total value of the plant may be justified for a particular project. For less highly specialized plant, some salvage may be anticipated, depending on storage cost, resale value, and

probability of sale or reuse in the immediate future. The total project charge including operation, maintenance, and repair should be distributed in proportion to the time and item the plant is used on the various contract items. Cost of plant required for the production of concrete, aggregates, ice or heat for cooling or heating of concrete, etc.; should normally be included in the estimate as part of the cost of these materials or supplies manufactured or produced at the site.

9.7 SMALL TOOLS

The cost of small power and hand tools and miscellaneous non-capitalized equipment and supplies-should be estimated as a percentage of the labor cost. The allowance must be determined by the cost engineer in each case, based upon experience for the type of work involved. Unit prices based on historical data already include a small tools allowance. The small tool cost will be considered as part of equipment cost. Such allowance can range typically up to 12 percent of direct labor cost. The cost engineer must ensure that this cost is not duplicated in the overhead rate percentages. The crew's database in the Cost Book does not contain a small tools allowance.

CHAPTER TEN

MATERIALS AND SUPPLIES

10.0 INTRODUCTION

Materials and supplies are defined below and, for the purpose of estimating, both can be considered materials unless they need to be separated because of different in rates.

- **Materials**
  Those items which are physically incorporated into and become part of the permanent structure.
- **Supplies**
  Those items which are used in construction but do not become physically incorporated into the project such as concrete Forms

10.1 SOURCES OF PRICING DATA

Prices for materials and supplies may be obtained from pricing services, the Cost Book, catalogs, quotations, and historical data records. Each office should review their source of the pricing and assess the reasonableness prior to use. Standard unit prices from these sources are considered satisfactory only after an applicability determination has been made. Care should be taken when using this type of cost data to make proper allowances for quantity discounts, inflation, and other factors affecting contractor cost.

10.2 QUOTES FROM MANUFACTURERS AND SUPPLIERS

Quotes should be obtained for all significant materials and installed equipment and for specialized or not readily available items. Quotations may be received either by writing or telephonically. It is preferable to obtain quotes for each project to ensure that the cost is current and that the item meets specifications. if possible, more than one cost note should be obtained to be reasonably sure the prices are competitive. The cost engineer should attempt to detennine and ensure that contractor discounts are considered in the estimate. Quotes should be kept proprietary to preserve the confidentiality entrusted. A sample telephone quotation data sheet should be utilized for recording quoted information.

10.3 WASTE ALLOWANCE

Waste and loss considerations may be included in material unit price computations. This methodology when computing material costs results in a quantity takeoff of work placement, which is not altered to reflect material losses. However, the alternative methodology of increasing the measured quantity by waste and loss quantity is acceptable if the excess quantity will not be used for any other purpose. The methodology used by the cost engineer should not charge labor on the excess quantity. In either case, a note statement is required in the estimate explaining the methodology used.

10.4 FORWARD PRICING

Sometimes quotes are requested in advance of the expected purchase date. However, suppliers are reluctant to guarantee future prices and often will only quote current prices. It may therefore be necessary to adjust current prices to reflect the cost expected at the actual purchase date. This cost adjustment, if required, should not be included as a contingency, but should be clearly and separately defined in each estimate. Adjust current pricing to future pricing using program specific escalation factors. Computations of adjustment should be clear and should be maintained as cost estimate backup support.

10.5 FREIGHT

The cost engineer should check the basis for the price quotes to determine if they include delivery. If they do not include delivery, freight costs to the project site must be determined and included. The supplier can usually furnish an approximate delivery cost. For delivery charge, Free on Board (FOB) refers to the point to which the seller will deliver goods without additional charge to the buyer.

- **FOB Factory or Warehouse**

If the materials or supplies are FOB factory or warehouse, freight costs to the construction site should be added to the cost of the materials or supplies.

10.6 UNLOADING AND TRANSPORTING THE MATERIALS OR SUPPLIES

If the cost of materials or supplies includes partial delivery, FOB to the nearest rail station, the cost of unloading and transporting the materials or supplies should be included in the estimate.

- **Large Quantity in Bulk**

If the materials or supplies are a large quantity in bulk from which would require extensive equipment for unloading and hauling, it may be desirable to prepare a labour and equipment estimate for the material handling and delivery.

10.7 HANDLING AND STORAGE

The contractor is usually required to off-load, handle and stockpile, or warehouse materials on site. These costs should be included in the estimate. An item of electronic equipment requiring special low-humidity storage might have this special cost added to the direct cost of the equipment. For common items, such as construction materials or equipment needing secure storage, the cost for the security fencing, temporary building and material handling should be considered as an indirect cost and be included in the job-site overhead cost.

- **Taxes**

When applicable, state and local sales tax should be added to the materials or supplies cost. In some states, material incorporated into Federal construction is exempt, but supplies are not. Care should be taken, therefore, that the sales tax rate is applied as

required. The cost engineer should verify the tax rates and the applicability of these rates for the project location. Sales tax is considered a direct cost of the materials and supplies, and also should be applied to Government-Furnished Equipment (GFE) and included in the estimate.

• Materials or Supplies Manufactured or Produced at The Site

If it is likely the contractor will manufacture or produce materials or supplies at the project site, a separate estimate component should be developed for this work. This estimate should be detailed equipment, labor, materials, and supplies estimate, and should conclude with a unit cost of material or supply delivered to the stockpile, storage yard, or other end point.

• Government-Furnished Materials (GFM) or Equipment (GFE)

On some projects, the Government may provide some of the project materials. Government-furnished materials and equipment should be estimated in the same manner as other materials, except that the purchase price is not included. The estimate should include an allowance for transporting handling, storage from point of delivery and assembly, sales tax and installation if applicable. There may be special costs associated with Government-furnished materials such as insurance to cover loss until final installation or storage costs, or special security measures. Note that these materials and procurement costs are normally to be included as part of the total project cost.

CHAPTER ELEVEN

SUBCONTRACTED WORK

11.0 INTRODUCTION

In construction, specialty items such as plumbing, heating, electrical, roofing, plastering, and tile work are usually more effectively performed by subcontract. With so many specialties being performed, subcontract work becomes a very significant portion of the total costs of construction. Since each estimate should be prepared as practically and as realistically as possible, subcontract costs become a necessary consideration.

11.1 PARTS OF WORK TO BE SUBCONTRACTED

The cost engineer must first determine those parts of the work that will probably be subcontracted. When the work to be subcontracted has been determined, those items will be identified in the estimate. The appropriate subcontractor overhead and profit costs should be applied to subcontractor direct cost items in addition to the appropriate prime contractor overhead and profit.

11.2 COST OF SUBCONTRACTED WORK

The cost of subcontracted work is the total cost to the prime contractor for the work performed. Subcontractor's costs include direct labor, materials and supplies, equipment, second

tier subcontracts, mobilization and demobilization, transportation, set-up, and charges for overhead and profit. Particular attention should be given to large items such as turbines, generators and incinerators. The total subcontract cost is considered a direct cost to the prime contractor.

11.3 CONSTRUCTION CONTRACTUAL METHODS

The cost engineer should be aware of the type of contractual method for which the solicitation is being issued. Limited competition contractual procurement methods may result in multiple compounded levels of subcontracted work, e.g. compounded subcontractors' markups passed on to the prime contractor. The prime contractor is required by the contract to perform a minimum amount of work, but all the remaining work may be performed by subcontractors. Particular attention should be given to the workload capacity and workforce capability of the prime contractor. If the prime contractor already is at full capacity in performing other work, or their own workforce resources are at maximum usage, then the prime contractor will likely subcontract to the maximum extent allowable. Also, the same scenario would occur for the subcontractors if they are at their maximum capacities.

11.4 USE OF QUOTATIONS

The cost engineer may utilize quotes for the expected subcontracted work when reviewed and verified as reasonable. In lieu of a quotation, each task of the subcontract should be priced as a direct cost with an appropriate rate of subcontractor's overhead and profit added.

- Temporary material storage.
- Temporary utilities.
- Preparatory work and laboratory testing.
- Transportation vehicles.
- Supplies and maintenance facilities.
- Temporary protection and Occupational Safety and Health Administation (OSHA) requirements.
- Telephone and communications.
- Permits and licenses.
- Insurance (project coverage).
- Schedules & reports.
- Quality control.
- Cleanup.
- Taxes.
- Equipment costs not chargeable to a specific task.
- Operation and maintenance of temporary job-site facilities.

11.5 MOBILIZATION AND PREPARATORY WORK

The costs of mobilization and preparatory work, including the setup and removal of construction facilities and equipment are part of overhead costs unless there is a specific bid item for large projects, the cost for each part of this initial work should be estimated on a labor, materials, and equipment basis. For smaller projects, these costs may be estimated based on experience.

11.6 GENERAL HOME OFFICE OVERHEAD (G&A)

Home office overhead expenses are those incurred by the contractor in the overall management of business, associated with all costs at the home office. Since they are not incurred for any one specific project, they must be apportioned to all the projects. Many expenses such as interest and entertainment are not allowable. Construction equipment depreciation is included in the Construction Equipment and Operating Expense Ownership Schedule cost rates and should not be included in the G&A rate. An accurate percentage of G&A can only be determined by an audit. On major charges requiring an audit, it is important to request that the G&A rate be determined.

Of all the categories of costs, the contractors G&A costs are the least definable. Each contractor organizes his company differently from any other. Each incurs costs differently from varying sources and manages operations of that home office by their own methodology. It is important to understand that home office costs are not standard and fixed. Even though the cost for a specific contractor varies from period to period, a rate is normally averaged as a computation of total home office costs over a sufficient period divided by the total volume of business during that specific period. This rate computation methodology allows distribution and projection to future project estimates. When more specific data is not available, the cost engineer may include empirical rates. Empirical G&A rates typically range from three percent for large contractors to ten percent for small contractors. Home office costs are typically included in the

and audit reports of previous similar projects. Other sources include previously negotiated modifications and review of organizational charts of construction firms for staffing and overhead costs evaluation. Overhead salaries should include an allowance for payroll taxes and fringes such as Federal Insurance Contributions Act (FICA), health benefits, and vacation.

11.9 DISTRIBUTION OF OVERHEAD

The prime contractor's overhead costs, which have been costed in an organized format, should be summed and distributed to the various bid items. A proportionate distribution is commonly made by percentage ratio of total direct costs to those direct costs in each item. When additive or split-bid items are included, only those overhead costs, which relate directly to the additive work, should be distributed to those additive items. Those overhead costs, which the contractor will incur regardless of additive or deductive items, should be distributed to base bid schedule items only. Selective distribution ensures recoupment of costs if only the basic contract scope is awarded. Regardless of the method of distribution, the estimates should clearly demonstrate the procedures and cost principles applied. For modification estimates, overhead requirements should be itemized and costed to reflect the actual net change in cost of

overhead, that is, costs before and after the modification work. As a refinement to distribution, the cost engineer may reasonably and justifiably reduce the prime overhead distribution on subcontract work items. The balance of the total prime overhead should then be distributed as discussed above to the remaining prime items of work.

CHAPTER TWELVE

PROFIT

12.0 INTRODUCTION

Profit is defined as a return on investment. It is what provides the contractor with an incentive to perform the work as efficiently as possible. A uniform profit rate should be avoided.

12.1 WEIGHTED GUIDELINES METHOD

There are various types of weighted guideline methods determining profit according to the FAR and its supplements. The proper weighted guideline method to use will depend on the type of contractual acquisition, action and the supplemental regulations that apply tothe contracting activity. Reference here is made concerning the use of weighted guideline when price is based on a negotiated firm fixed price construction contracts. The use of the weighted guideline method when price is negotiated will be per the cognizant design agency guidance. The determination of profit, as appropriate for each procurement action, may be determined and submitted on the sample worksheet. Explanation of the factors to be used in calculating profit, are described below. The weighted guidelines method yields a reasonable profit value and should be used to determine profit for all contracts that include profit. This methodology should also to be used wherever a detailed

direct costing method is used for preparing current working estimates. A rate of profit may be used based on historical experience for early stage estimates prepared for programming, reconnaissance, or concept design.

12.1.1 Weighted Guideline Factors

Based on the circumstances of each procurement action, each of the factors will be weighted from 0.03 to 012 as discussed in the following text and provided in Table below. Statements in sufficient detail to explain the reasons for assigning the specific weights shall be included on the profit computation sheet. The value will then be obtained by multiplying the rate column by the weight column. The value column when totaled indicates the fair and reasonable profit percentage.

- **Degree of Risk**: Where the work involves no risk or the degree of risk is very small, the weighting should be 0.03; as the degree of risk increases, the weighting should be increased up to a maximum of 0.12. Lump sum items will have, generally, a higher weighted value than unit price items for which quantities are provided. Other things to consider include; the nature of work; where the work is to be performed; the reasonableness of negotiated costs; the amount of labor included in the costs; and whether the negotiation occurs before or after the period of performance of work.

- **Relative Difficulty of Work**: If the work is difficult and complex, the weighting should be 0.12 and should be proportionately reduced to 0.03 on the simplest of jobs. This

factor is tied in to some extent with the degree of risk. Some things to consider include technical nature of the work; by whom work is to be done; location of work; and time schedule.

- **Size of the Job**: Work not in excess of $100,000 will be weighted at 0.12. Work estimated between $100,000 and $5,000,000 will be proportionately weighted from 0.12 to 0.05. Work from $5,000,000 to $10,000,000 shall be weighted at 0.04 and work in excess of $1 0,000,000 at 0.03.
- **Period of Performance**: Jobs in excess of 24 months are to be weighted at

  0.12. Jobs of lesser duration are to be proportionately weighted to a minimum of 0.03 for jobs not to exceed 30 days. No weight is given for modification estimates when additional performance time is not required.
- **Contractor's Investment**: Jobs are to be weighted from 0.03 to 0.12 on the basis of below average, average to above average of contractor investment. Things to consider include amount of subcontracting; mobilization payment item; Government-furnished property; method of making progress payments; and front-end requirements of the job.
- **Assistance by Government**: Jobs are to be weighted from 0.12 to 0.03 on the basis of below average to above average. Things to consider include use of Government-owned property, equipment and facilities, and expediting assistance.

- **Subcontracting**: Jobs are to be weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the work is to be subcontracted, the weighting is to be 0.03 and such weighting proportionately increased to 0.12 where all work is performed by the contractor's own forces.

12.2 SEPARATE PROFIT CALCULATION

A separate profit calculation should be performed for the prime contractor and for each subcontractor. When the subcontractor assumes the risk and responsibility for portions of the work, the prime contractor's profit rate on that work should be decreased. As a general rule, profit is applied as a percentage rate to the total of all costs required by the contract or modification scope. For early design stage estimates, a rate of profit may be assumed based on past historical experience.

Weighted Guidelines Profit Sheet

Project: Estimated By:

Contract No: Checked By:

Change Order No: Date: 9/14/05

Profit Objective Est: (Prime Contractor, Subcontractor)

Factor	Rate (%)	Weight (0.03 - 0.12)	Value
1. Degree of Risk	x	=	
2. Difficulty of work	x	=	
3. Size of Job	x	=	
4. Period of Performance	x	=	
5. Contractor's Investment	x	=	
6. Assistance by Government	x	=	
7. Subcontracting	x	=	
		Profit Factor	%

COMMENTS (Reasons for Weights Assigned):

1.
2.
3.
4.
5.
6.
7.

Figure 8.0 Weighted Guidelines Profit Sheet

Table 8.0 Guidelines for Weighted Factors Profit Determination