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# Budgeting and Cost Control in a Construction Project Management

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**Abstract-In the construction field, most civil engineers are unaware of detailed project management,specifically budgeting and cost control of construction projects. It is difficult to asset information on budgeting and cost control even in the literature survey. This detailed study of project management would benefit civil engineering students to understand the explicit concept of budgeting and cost control. Basically, cost control is interdependent on the budget, so the knowledgeof budgeting and cost control is essential for the project's success and profit. In this review, we present meticulous information of budget planning and cost control with a two-step mechanism.**

**Keywords-cost management, budget, cost control, direct cost, and indirect cost.**

## I. INTRODUCTION

Project management is the key to the success of any project which leadsthe team to work to achieve the project goals with given restrictions, detailed knowledge, relatable skills, essential tools, and techniques to make the work worthwhile. Project management starts with the planning and initiation whichlater on, will be executed with proper monitoring and final closing of the project as per the goal.

In all this process, from planning to the closing of the project, correct management of funds is the key to success which is by considering profit with customer satisfaction is the most important factor for the growth of the company and individuals which is simply called Cost Management. In project cost management, to keep expenditures within the approved budget, we follow the steps like estimation, budgeting, and costs controlling throughout the project life cycle. Project cost management can be divided into planning, estimation, budgeting, and cost control. In this project, we are going to study the concept of budgeting and Cost control in detail, how to prepare the budget for a construction project, and what factors are required to be considered while preparation of the budget like Direct (Hard) cost and Indirect (soft) costs,

Study of how to manage the Cost control of a construction project to complete the project with profit and customer satisfaction. Finally, we will do a case study on a budget by preparing a budget for a project. Initially, we need the Bill of quantities and the General Arrangement Drawing (GAD) of the project which is always available when we are planning to start a new project or in case of tenders from different clients, these data are available. Therefore, from this basic data, we will discuss how to prepare the budget by considering all the factors that affect the project's profit-loss statement and give an idea about at what level of cost management we are going to work on and what changes we need to do, or what corrections we required in our working style.

Construction Project Management can be divided into eightcategories, such as Project Management Planning, Time Management, Quality Management, Contract Administration, Risk Management, Safety Management, Construction Management Professional Practice, Cost Management, etc.All these categories play a vital role in the project's success. A project management plan is a formal document that defines how a project is going to be carried out. It outlines the scope, goals, budget, timeline, and deliverables of a project, and it's essential for keeping a project on track.

Cost Management is a function that includes the processes which are required to maintain effective financial control of projects; it can be split into cost management as, evaluating, estimating, budgeting, monitoring, analyzing, forecasting, and reporting the cost information.

According to Techslang "Cost management is simply the process of planning a company's budget and controlling it as well as spending the money according to the budget".Cost management in project management is the process of planning, estimating, budgeting, and controlling the project cost.
For a project to be called successful, it must carry on the requirements and scope, its execution quality is of a high standard, and it should be completed within schedule and budget with customers or the client's satisfaction.

Project cost management helps to create a financial baseline which project managers can target the status of their project costs and realign the direction if

needed.Steps involved in cost management are Resource planning, cost estimation, cost budgeting, and cost control.Resource planning is the first and most important step that comes in cost management, which can be called as the heart of any cost management initiative.

To make a project a reality, managing every resource like money, manpower, machinery, material, utilities, etc. is the main task that can be planned here. The goal of cost estimation is to prevent budget overruns and provide an accurate calculation of all assigned costs to each project element. Estimates need to be validated by company leaders, clients, and suppliers.

Resource planning and estimation at the initial stage of the project are varied most of the time according to different factors like changes in drawings, material availability, market conditions, geotechnical conditions, and so on and so forth which later affect budgeting, therefore these possibilitiesmust be consideredduring budgeting.

Cost budgeting is mainly involved setting an approved budget for each task of the project, as determined by the resource plan and cost estimation. It aims to identify a cost baseline to keep costs on track. Budgeting is important in the development of any major business project, whereas, cost control refers to the practice of adjusting costs based on the predetermined budget and cost required during actual construction. The overall end goal of cost control is to increase the profitability of the project, and the company with customer satisfaction.

Cost estimate in the initial stage, budget in the planning stage, cost monitoring in the execution stage, and financial evaluation in weekly/fortnightly, monthly, quarterly, yearly and in the closing stage are the basic tools of cost control. In this paper, we are going to study the last two steps in Project cost management which are Budgeting and cost control with the example of one bridge project.

## II. OBJECTIVES

i) To know the value of Budgeting & Cost control in the success of a construction project with profitability.
ii) Study, how to prepare a budget for a construction project
iii) Study of how to manage the Cost control of a construction project to complete the project with profit.
iv) Preparation of a budget for a construction project.

## III. STUDY AREA OF THE PROJECT

Every entrepreneur works for their personal ans company's growth. Nowadays there is a vast increase in the procurement of construction material. The ratio Labour cost: Material cost in construction is approximately 30:70 or 40:60 which means the material acquired is approximately 60% to 70% cost of the project concerning labor costs. Similarly, another key factor that needs to be considered while preparing the budget isthe hard costs and soft costs of the project. Hard costs account for 70% to 85% of the total construction costs whereas, soft costs account for just 15% to 30% of the total construction costs, but we can save cost with proper management of soft cost as it is not directly linked with the construction items but is important and controllable.

Therefore, to start with the preparation of the budget, the concept of what is budgeting and what is hard cost and soft cost must be clarified in detail. The potrayal toward profit ratio does not finish after the preparation of the budget, but the budget execution starts with cost control. For cost control, these three fundamental questions should be asked: where to save the cost? What methodology do need to be adopted for cost control? And where to focus?

Here we introduce the cost impact sheet, which plays an important role in cost control, as it shows us the cost impact on the budget cost while the issue of new work order/ purchase orders timely. After reading the topic, everyone thinks that it is a theoretical topic, nothing is practical here. But as we go through it, we will understand how practical, and the key topic is this.

## IV. METHODOLOGY

**1. Budget Planning:**

Fig 1. Process chart for Budget methodology.

**1.1 Project Gist/ Details/Salient Features** – To start budgeting the basic information is required to collect which is called Salient features or Project GIST (Goals, Ideas, Step-Projects, and Tasks). Examples of some of the points that come under salient features are Project name, location of the project, agencies involved in the project such as Client, architect, design consultant, PMC, suppliers, vendors, etc., Tender or project cost, Start and completion date of the project, project details such as type of structure, built-up area, configuration, etc., contract clauses such as, defect liability period (DLP), Basic rate, Price variation, Milestone, liquidated damage, mobilization advance and so on. Collection of all this information needed for the budgeting. Keeping the compatible designs and detailed construction process,

with alternative methods of calculation in the absence of the project.

**1.2 Project Planning-**At every stage of construction, project planning is done as per requirement. Design a standard model of planning with all activities defined and identified for each activity, Resources like material, manpower, plant & machinery, overheads, utilities, etc. required for completion of the project with the cost of these resources. At the initial stage, during construction and post-construction we are doing the project planning as and when it is necessary and required to revise as per the situation at that time.

**1.3 Suppliers and Sub-Contractors:** Suppliers and Subcontractors help in the budgeting process as they have the actual ideas about the cost of the resources. Having Suppliers/ Sub-contractors set out the prices of the materials, products, and services for the budget according to the project type, material type, project location, design, structure, etc.

**1.4 Calculation of Budget:** Determination of the values of execution of the project based on information available at the time of commencement i.e. estimated information/ specific information. We can divide the calculations as Hard cost and Soft cost, put the values of the items that come under Hard cost and Soft cost, working on where we can save the cost as the control of soft cost is in hands of project managers or management team. Decision making plays a vital role here. The example is, at the time of mobilization all the staff is not allotted to save the manpower cost and planned according to the activities by using the schedule of the work.

**1.5 Commitment:**Measuring the company's commitment to implement the project by the planning done. We can improve the company's commitment by,

- Standardizing the working process - with the help of past work experiences, standard codes, designs, etc.
- Technical Training – by providing the training by the senior professionals either internal or external to improve the working capacity with the quality of the manpower involved in the project.
- Implementation capacity – The technologies, construction methods, etc. are implemented day by day and accordingly, the organizations made implement in their working style. But the acceptance of the implementation is not that easy in some cases, therefore we need to check it.

**2. Cost Control:**

Fig 2. Key Points of Cost Control.

**2.1 Project Feasibility:** Project feasibility is the study of various elements of the project to determine the potential for project success. It will be done before the start of a project to identify obstacles, form strategies to overcome them, and ultimately attract investors, and finally perform financial modeling using current cost.

**2.2 Bidding & Contracting:** Here we compare the contracts to budgets. A contract is a legal agreement between the client and the contractor after completion of bidding, which contains terms & conditions, a bill of quantities (BOQ), drawings, and specifications. The contractor has to work on these factors and prepare the budget by referring to them. In the budget, we considered overheads and profit which are not mentioned in the main BOQ. Therefore, we have to compare the contract to the budget.

**2.3 During Construction:** During construction, one should be reviewed projected costs & variance. A projected cost is the predicted total cost of the project or a milestone/phase at the time of its completion, which should be reviewed for the original estimated cost is entered at the milestone/phase level, and the current estimated cost is automatically set equal to the original estimated cost. Cost projection analysis,

- Identify project development expenses where finance planners identify an amount of finance required for developing the project,
- project delivery costs Estimation,
- Creating a high-level description of the project costs,(iv) ongoing maintenance costs identification etc. Variance can either be favorable or unfavorable. The example of Unfavorable variances means that cost of labor exceeds the budgeted value, while favorable variances mean the cost of labor cost was less than the budgeted value.
- Therefore, a review of the projected costs and the variance at each phase/ milestone helps to know where we can control the cost and where the cost will be unavoidably exceeding.

**2.4 Post Construction:** After the completion of the construction project, one should perform a Variance analysis. To understand the exact status of the variance

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in budget cost and the actual cost while construction an analysis should be done. This analysis can be done post-construction or after achieving a milestone or monthly/quarterly/yearly. It can be changed as per the organization's review cycle.

## V. HOW TO EXECUTE THE BUDGETING AND COST CONTROL?

### 1. Preparation of Budget:

#### 1.1. Data Collection

Proper Data collection helps to prepare a proper budget

- Collect Project GIST (Goals, Ideas, Step-Projects, and Tasks)/ salient features
- Collect Drawings and specifications
- Collect Bill of quantities (BOQ) – BOQ is not fixed till work completion, it can be changed if the drawings & specifications will be changed,
- Prepare Rate analysis of each BOQ item
- Prepare Work breakdown structure (WBS),
- Prepare a Labour master list with current market rates
- Prepare a Material master list with current market rates
- Prepare Plant and machinery (P&M) master list with current market rates for purchase as well as for hiring
- Prepare the standard diesel/fuel consumption list for each P&M to get the diesel/fuel cost.
- Lead calculations for the supply of material, like Murum, aggregates, etc.
- Prepare a hierarchy for the project and accordingly the list of employees allotted for the project with their current salary and possibilities of promotions/ bonuses till the completion of the project.
- Prepare a detailed schedule for Site mobilization – Site mobilization is the initial setup that contains a number of factors that need to be considered and are comes under Indirect cost/ soft cost/ overheads. The factors that come under this are, divided as, (a) For Staff, (b) For labor, (c) For work execution.

**For Staff –**

- Staff accommodation in the project/site office area or outside the project/site office area with all living facilities.
- Vehicles for staff Conveyance,
- Staff insurance and Medical facilities

**For labour/ drivers/ operators-**

- Labour camp with facilities like electricity, drinking water, toilets and wash area with proper drainage systems, etc.,
- CAR policy,
- Insurance & Medical facilities.

**For Site –**

- Site Office with facilities like electricity, drinking water, toilets with proper drainage systems, etc., · IT systems and services for staff like computers, printer & scanner, Mobiles, stationery, etc.,
- Security service with cabin,
- Installation of plant,
- Parking area for Machinery, vehicles, etc., · Canteen facility,
- Insurance for P&M,
- Material testing Laboratory,
- Storeroom,
- Steelyard,
- Safety material and PPE kits for staff as well as for labor, etc.
- There are a number of factors that come under the Indirect cost which can be controlled by the project manager with proper planning & scheduling.

#### 1.2. Budget Preparation:

After the collection of the data, we link it with the BOQ, rate analysis, and project planning. The result is our project budget. Another thing we have to consider is the contractor's profit, interests on loan, Bank guarantees, security deposits to the client, etc.

We can prepare the project budget in 3 different ways,

**1.2.1Vertical format** – in this format, from each BOQ item, we list out the vertical list of the material, labor, P&M, wastage, etc., make the total amount per unit and multiply it by the total quantity of the item, to get the budget rate & amount of that item as per Fig, No.

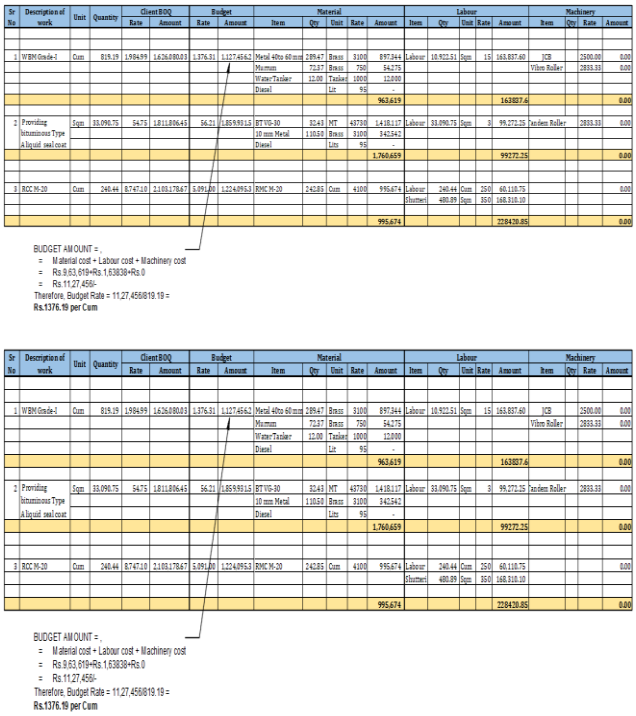


Fig 3. Vertical budget format.

**1.2.2 Horizontal format -** in this format, all the material, labor, P&M, etc., are listed horizontally and make the total amount per unit and multiply it with the total quantity of the item, to get the budget rate & amount of that item. The advantage of this format is, that we are able to take the sum at the end for each component (like Mason/ cement/ JCB) for material purchase, labor allotment, machinery hours, etc. as per Fig, No.

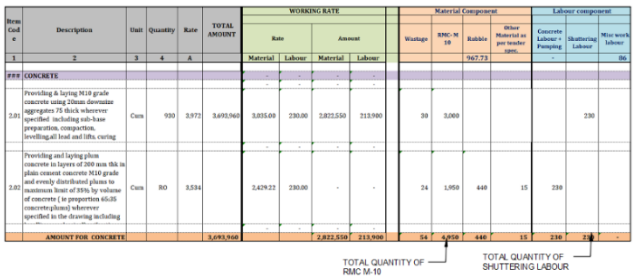


Fig 4.Horizontal budget format.

**1.2.3 Direct rate analysis-** in this format, we prepare a rate analysis in another sheet and link the per-unit rate in front of the BOQ item, multiply it with the total quantity of the item, to get the budget rate & amount of that item.

**2. Budgeting Cycle:**

The role is not finished, once the budget is prepared, but there is a budget cycle as shown in Fig.3 below,

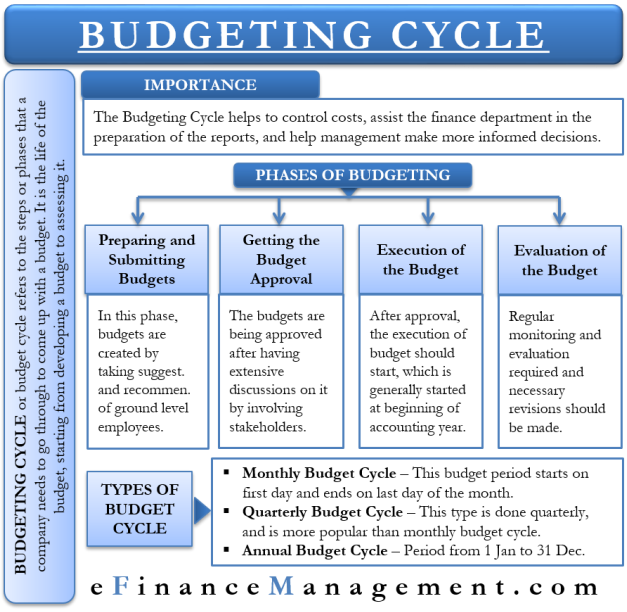


Fig 5. Budgeting cycle

**3. Important Reports for Cost Control:**

- Project cost abstract with detailed rate analysis · Activity-wise cost analysis
- Resource schedule
- Billing schedule
- Subcontractor work order status
- Material recovery statement
- Work order issue and completion status report
- Payment status by work order or subcontractor or project
- Advance and recovery status for subcontractors
- Work order rate comparison is done for different subcontractors for the same activity.
- Rate comparison from the same subcontractor for the same activity in different projects or periods.
- Comparison of work orders with the client invoices.
- Comparison of work orders with the budget.
- BOQ amendment history
- Daily/ monthly/ quarterly/ half-yearly/ yearly progress report.
- Daily/ monthly/ quarterly/ half-yearly/ yearly work schedule.
- Monthly procurement plan.

Currently, most of the construction industries are going for Enterprise resource planning (ERP) software. Examples of ERP software are, SAP, Hit office, QE-Pro, Strategic ERP, Quadra, etc. All the reports mentioned above can be automatically generated, if we did the works like Work order preparation, billing, purchase, GRNs (Good issue note), and many more.

The different organizations required different reports for cost control in different formats, which are developed by the teams of the ERP software agencies as per the client's requirement. To get the reports as required, the site team, remote office/ branch officeteam, as well as the headquarters or main office team has to update the data, from time to time in the ERP. The base of this data comes from the budget. Therefore, for cost control, every person involved in the project should be aware of the project budget.

## VI. RESULTS & CONCLUSIONS

- Understand the importance of the study of budgeting at the education level.
- Understanding cost control is a key to the success of the project with high profitability.
- Learn the step-by-step procedure to prepare a project budget.
- Budgeting and cost control is not the theoretical topic, but it is the most important topic as the profit and loss factors control by this only.
- There should be practical at the education level regarding how to prepare the budget of a construction project and what are the cost control tools in the project.
- According to the survey done with the help of a questionnaire with the peoples working in the construction industry, approximately 70% of peoples think that Budgeting and Cost control is important in Construction Project Management in the range of 90% to 100%. And out of 100 construction

professionals, only 5 to 6 peoples are aware of budgeting and cost control.

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