UNIT-6 Project Cost Management

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Identify the costs involved in managing a project
- ✓ Outline effective cost management techniques.

Unit 6

Project Cost Management

Project costs are not just the costs of goods procured to complete the project. Any project has several factors contributing to its cost: the cost of materials needed to complete the project, the cost of the labour needed to complete the project, and the cost of the equipment needed to complete the project. For a project to finish on budget, these expenses must be estimated, planned for, and monitored.

In order to determine whether the project is worth carrying out, management and customers will want to know how much it will cost. They also need to know whether the project deliverable will be worth the cost and whether the project will be profitable. The estimates for project costs can take several forms. This unit examines the management of project costs, how to predict them, how to account for them, and then, with plan in hand, how to control them.

Determining the Initial Budget

Once the project is initiated, the project budget needs to be established in order that project costs might be attributed directly to it.

Breaking down Project Costs

Project costs can be broken down into roughly three areas: Resource or project costs, human resource costs, and administrative costs. Determining these costs is a responsibility that rests on either the finance manager or the project manager in a functional organization. Sometimes the budget is predetermined by the executive management staff; you will be told what it is and you will have to work with what you are given.

There are several sources of information you might consult to help you estimate the project costs if you are responsible for determining the initial budget. One of the first sources to consider is the documentation on previous projects that are similar in scope to your project. Review the documents from similar projects and use their total costs to determine a starting place. From that point, adjustments can be made to your new budget according to the differences in scope and detail of the new project compared to the one you are using as a reference.

You might also talk to key stakeholders, key team members, or others with experience of similar projects and ask them how much projects of this type have cost in the past. They are also good references to help run your initial budget figures before making them public.

Human Resource Costs

Personnel costs or human resourcesmay be one of your biggest expenses depending on the kind of project you are working on. Any project that requires highly specialized skills or knowledge, or is labour-intensive, will probably have high personnel costs.

Administrative Costs

Day-to-day costs that keep the organization running, but are not directly related to the project, are called administrative costs. These include local phone charges, support personnel, office equipment, leases, heating and lighting, etc.

The project manager will want to share some general thoughts about project costs with the selection committee and identify the major expenses of the project. The project budget will be further defined once adequate estimating can be completed, at which time the final project budget can be submitted for approval.

The activities involved in the Project Cost Management knowledge area establish estimates for costs and resources of the project. They also monitor those costs to ensure that the project stays within the approved budget. These processes may require the involvement of more than one person, depending on the complexity of the project. For example, the finance officer may not have expertise in the Resource Planning area, in which case a staff member with the skills to complete the Resource Planning process will be brought in by the project manager.

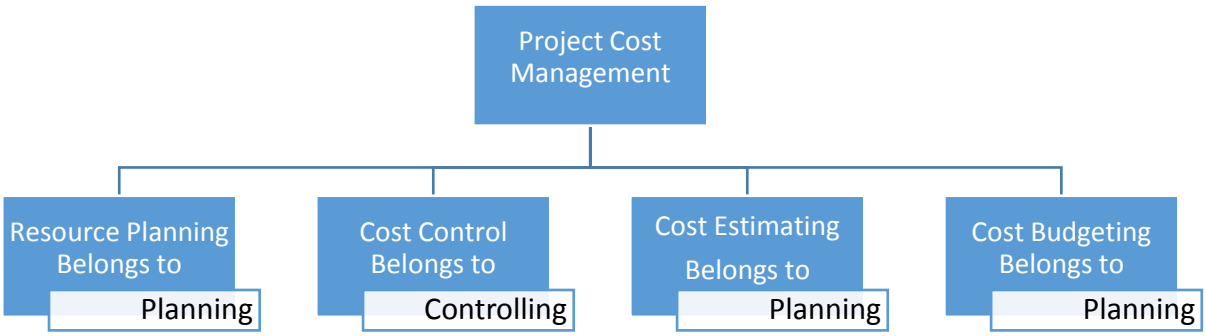


Fig: 6.1

Resource or Project Costs

The project itself will have resource expenses directly related to it. These are costs that are specific to the project, not the day-to-day operational expenses that we will cover shortly. These resource costs might be items like long-distance phone bills, specialized talent hired for certain portions of the project, hardware purchases, vendor fees, travel expenses related to the project, equipment purchases, etc. Again, depending on the kind of project on which you are working, resource expenses can be quite high as well.

Planning the Project Resources

The project manager must determine what resources are needed to complete the project, as part of the planning process. Resources include the people, materials, and equipment that will be utilized to complete the work. Additionally, the project manager must identify when the resources will be needed for the project and their required quantity. The identification of the resources, the schedule of the resources, and the quantity required are directly linked to the expected cost of the project work, as shown here:

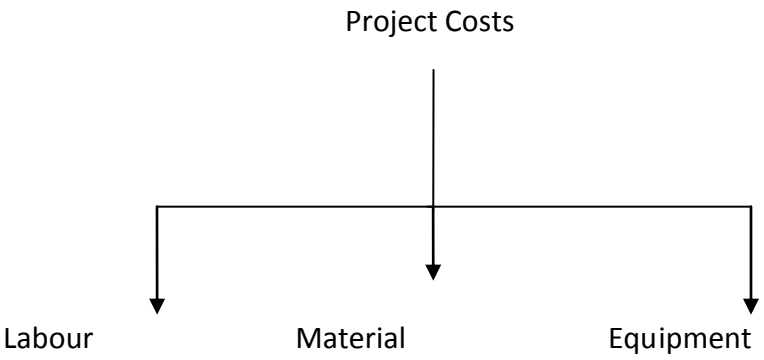


Fig 6.2

Services and sites are also considered resources. Your project may require a vendor's service, such as a carpenter, a commercial printer, or some other service. The project will suffer if these services are not available for the project as planned. Some projects require the leasing of space; the leased space is considered a resource.

Resource Planning Inputs

The process of examining the project work and determining what equipment, resources, and people are needed to complete the project is called Resource Planning. It also includes identifying the expected quantity of the required resources in order that the predicted cost might be calculated. These are some familiar inputs to resource planning:

- **Historical information:** Historical information should be used if it is available, as it is proven information rather than speculation. For example, if similar projects have been completed, historical information will indicate what resources were required for those projects.
- **Work breakdown structure:** The WBS is a deliverables-orientated breakdown of the components of the project. It assists the project manager and the project team in identifying the components requiring specific people, equipment and materials. The WBS is the primary input to resource planning.
- **Resource pool description:** Available resources for the project should be identified by the project manager. These include people, materials and equipment. The identified pool of resources may vary as the project passes through progressive elaboration. For example, in the early phases of a marketing campaign, the pool may include designers, computer professionals, copywriters, printing operatives and photographers. As the project moves through its phases to completion, the resource pool may be limited to only those people who have worked on the project in the early phases.
- **Organizational policies:** You must consider the performing organization's policies on staff acquisition. Additionally, any procurement policies to ascertain, lease or rent equipment must be evaluated. Before planning the resources, the project manager should be aware of these requirements — time invested in identifying resources may be lost if the process conflicts with the organizational policies.
- **Scope statement:** The scope statement defines the project work. It serves as a key input to resource planning. The scope statement should guide the resource planning process by identifying why the project was undertaken and what work is required to complete the project; thus, the required work can help identify the required resources to complete the project.
- **Activity duration estimates:** The duration of the activities should be ascertained in order that the project team and the project manager might consider the costs and benefits of assigning more effort to reduce tasks' duration where feasible. The time management processes should be able to readily provide the activity duration estimates.

Expert Judgment

The project manager and project team should be ready to identify and plan the project resource needs when they have access to the information about inputs to resource planning. The project manager and project team will apply reason, logic, and experience in evaluating the available resources in relation to the project requirements after examining the project work and the available resources.

A person or group might offer expert judgment on the project resource needs. To evaluate and analyze the resources that the project needs, the person or group offering the expert judgementshould have the necessary experience, training or expertise. Expert judgement can come from several sources:

- Trade and professional associations
- Industry groups
- Internal subject matter experts, such as resources from other departments
- External subject matter experts, such as consultants.

Identifying Alternative Solutions

Any process that identifies other solutions to an identified problem is called *Alternatives-identification*. Typically, these approaches use brainstorming and lateral thinking. In this process, alternatives-identification may include cross-training, buy-versus-build scenarios, outsourcing, and other activities. The idea of using alternatives-identification is to ensure that the identified resources are complete and that the cost of the resources is the best fit for the project work.

An approach to finding more affordable, less costly, methods of accomplishing the same work is called value analysis. For example, a project manager may change the sequencing of activities to shorten the project duration while saving labour costs by assigning high-cost resources only to the activities that demand them.

Cost Estimating

The process of calculating the costs of the identified resources needed to complete the project work is called cost estimating. The person or group doing the estimating must consider the possible conditions, fluctuations, and other causes of variances that may affect the total cost of the estimate.

There is a distinct difference between cost estimating and pricing. A cost estimate is the cost of the resources required to complete the project work. However, pricing includes a profit margin. In other words, a company performing projects for other organizations may carry out a cost estimate to see how much the project will cost to complete. With this cost information, they are able to factor a profit into the project work, as shown here:

The Cost Estimating Inputs

Cost estimating relies on several project components from the Initiation and Planning process groups. This process also relies on historical information and policies from the performing organization.

- ### Using the Work Breakdown Structure

  Of course, the WBS is included—it is an input to five major planning processes: cost estimating, resource plans, risk management planning, cost budgeting, and activity definition.

- ### Relying on the Resource Requirements

  The only output of resource planning serves as a key input to cost estimating. The project will require some resources—the availability of materials, the skills of the labour, or the function of equipment must all be accounted for.

- **Calculating Resource Rates**

  The cost of each resource must be known by the estimator. The cost should be in some unit of time or measure—such as cost per hour, cost per metric ton, or cost per use. The rates themselves may also have to be estimated if the rates of the resources are not known. Of course, skewed rates on the estimates will result in a skewed estimate for the project. There are four categories of cost:

a) **Fixed costs**remain constant throughout the project (the cost of a consultant brought onto the project, the cost of a piece of rented equipment for the project, etc).

b) **Variable costs**vary depending on the conditions applied in the project (number of meeting participants, supply and demand of materials, etc).

c) **Direct costs**are attributed directly to the project work and cannot be shared among projects (hotels, long-distance phone charges, airfares, etc).

d) **Indirect costs**are representative of more than one project (access to a training room, utilities for the performing organization, project management software license, etc).

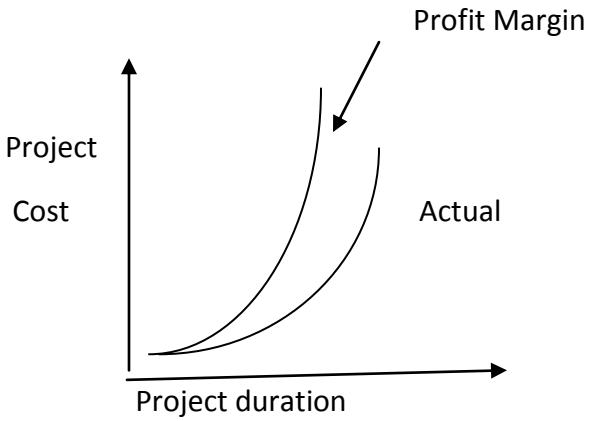


Fig: 6.3

Estimating Activity Durations

Estimates of the duration of activities are needed in order to make decisions on financing the project. These estimates predict the length of the project. Knowing the duration of the activities will help the performing organization calculate the total cost of the project, including the finance charges. Recall the formula for present value, which is PV= FV/(1+R)n; PV is the present value, FV is the future value, n is the number of time periods and R is the interest rate. The value of the project's future earnings may need to be measured against the present value to determine whether the project is worth financing. In order to extrapolate the total cost of the work packages, it is necessary tocalculate the duration of activities. For example, if Amy's cost per hour is £20 and an activity is estimated to last 10 hours, the cost of the work package is £200.

Utilising Historical Information

Historical information is proven information and can come from several places:

- **Project files:** As a reference to predict costs and time, past projects within the performing organization are valuable. Care must be taken to ensure that the records referenced are accurate, somewhat current, and reflective of what was actually experienced in the historical project.
- **Commercial cost-estimating databases:** These databases provide estimates of what the project should cost. These are based on the resources, variables of the project, and other conditions.
- **Team members:** Team members may have specific experience with the project costs or estimates. Recollections may be useful, but they are highly unreliable when compared to documented results.

Project Costs Estimates

Interested stakeholders, management and customers will all be interested in what the project will cost to complete. Several approaches are available for estimating cost.

Using Parametric Modelling

Parametric modelling uses a mathematical model based on known parameters to predict the cost of a project. The parameters in the model may vary based on the type of work being completed. A parameter may be cost per cubic yard, cost per unit, etc.

There are two types of parametric estimating:

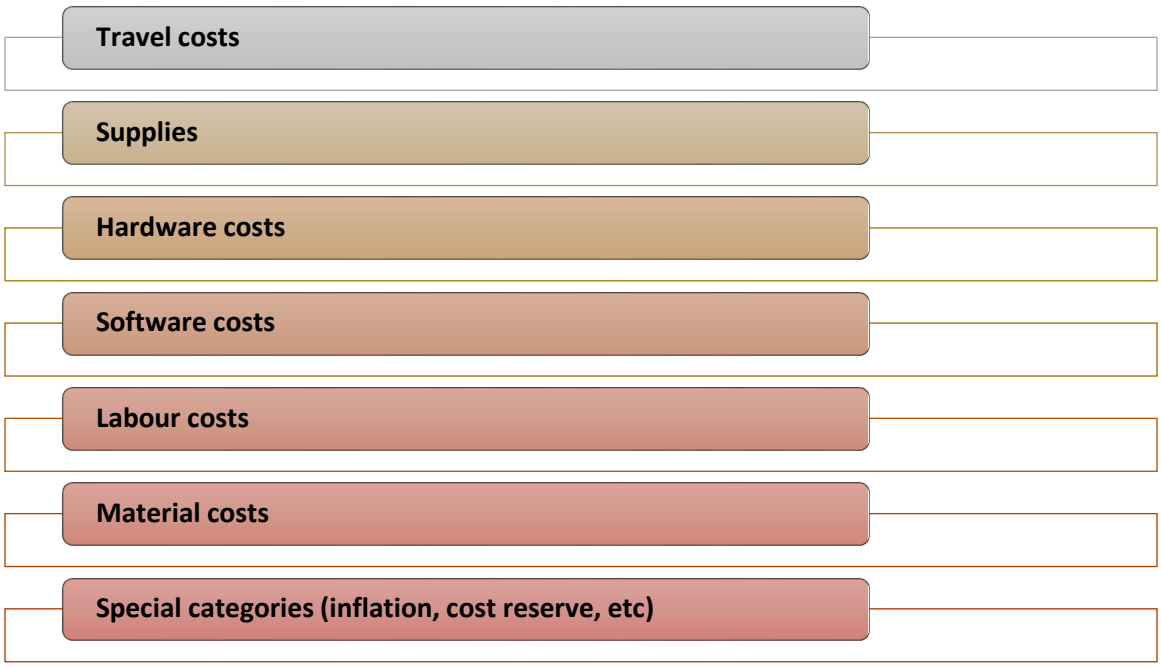
Learning curve: This is a simple approach; the cost per unit decreases as the workers complete more units; this is because workers learn as they complete the required work. The more an individual completes an activity, the easier it is to complete. The estimate is considered parametric, as the formula is based on repetitive activities, such as painting hotel rooms, wiring telephone jacks, or other activities that are completed repetitively within a project. As the experience increases, the cost per unit decreases, since the time needed to complete the work is shortened.

Regression analysis: This is a statistical approach to predict future values based on historical values. In regression analysis, quantitative predictions are made based on variables within one value to predict variables in another. This form of estimating relies solely on pure statistical maths to reveal relationships between variables and predict future values.

Cost Estimating Results Analysis

The output of cost estimating is the actual cost estimates of the resources required to complete the project work. Typically, the estimate is quantitative and can be presented in detail against the WBS

components. It can also be summarized in terms of a grand total, by phases of the project, or by major deliverables. Each resource in the project must be accounted for and assigned to a cost category. Categories include the following:



The cost of the project is expressed in monetary terms, such as dollars, euros or yen, enabling management to compare projects based on costs. Depending on the demands of the performing organization, it may be acceptable to provide estimates of staffing hours or days of work required to complete the project along with the estimated costs.

The cost of the risks should be identified along with the cost of the risk responses, since all projects have risks. The project manager should list the risks, the response to the risk should it come into play, and the expected risk event value.

Supporting Details Consideration

Supporting details must be organized and documented once the estimates have been completed. These show how the estimates were created. This material, even the notes that contributed to the estimates, may provide valuable information later in the project. The supporting details specifically include the following:

- **Information on the project scope work** may be provided by referencing the WBS.
- **Information on the range of variance in the estimate:** For example, based on the estimating method used, the project cost may be £220,000 ± £15,000. This project cost may be as low as £205,000 or as high as £235,000.

- **Information on the approach used in developing the cost estimates** can include how the estimate was accomplished and the parties involved in the estimate.

Cost Management Plan

Details on how variances from the project costs will be managed are covered by the cost management plan. The performing organization may have policies and procedures on the expected reactions to cost variances within the project. For example, variances over a set dollar amount may prompt the project manager to create a Variance Report, initiate an audit or meet with management.

Cost Budgeting

The process of assigning a cost to an individual work package is called Cost Budgeting. The goal is to assign costs to the work in the project so that the work may be measured for performance.

- **Consider the Inputs to Cost Budgeting**
  Because cost budgeting and cost estimating are so closely related, you can expect many of the same inputs for both. Here are the inputs to cost budgeting:
- **Cost estimates** serve as key inputs; they are the predicted cost for the project work.
- **Work breakdown structure** is a key input to this process, as it is the deliverables of the project—it is what the project is buying.
- **Risk management plan** is considered because of the information it provides on the probability of identified risks and their associated costs. The risks may also have an expected risk value that may contribute to the contingency reserve for the project.
- **Project schedule** is needed to determine when the monies in the budget will be spent. Sequenced activities against a projected timeline should be reflected by the schedule. This allows management not only to plan financially but also to compare expected cash inflows against the cash outflows the project will demand.

Developing the Project Budget

Creating the project cost estimates uses the tools and techniques that are also used to create the project budget. Here is a quick reminder of the four components:

- **Bottom-up budgeting** is the most reliable approach, although it takes the longest to create. It starts at zero and requires each work package to be accounted for.
- **Analogous budgeting** is a form of expert judgement that uses a top-down approach to predict costs. It is generally less accurate than other budgeting techniques.

- **Parametric modelling** is an approach that uses a parametric model to extrapolate the costs of a project (for example, cost per unit and cost per hour). Depending on conditions, it may include variables and points.
- **Computerized tools** are the same software programs used in estimating and can help predict the project budget with some accuracy.

Creating the Cost Baseline

Cost baseline is an idea which allows the project manager and management to predict when the project will be spending monies and over what time period. The purpose of the cost baseline is to measure and predict project performance. There may be multiple cost baselines in large projects that have multiple deliverables. These illustrate the costs within each phase. Additionally, larger projects may have cost baselines to predict spending plans, cash flows of the project, and overall project performance.

Measuring performance is the purpose of a cost baseline, and a baseline will predict the expenses over the life of the project. Any discrepancies early on in the actual costs and the predicted baseline serve as a signal that the project is slipping.

Implementing Cost Control

Cost control allows the project manager to confront the problem, find a solution, and then act accordingly. Specifically, cost control focuses on these activities:

- Controlling causes of change to ensure the changes are actually needed
- Controlling changes in the project and their influence on cost
- Communicating the cost changes to the proper stakeholders
- Working to bring and maintain costs within an acceptable range
- Performing cost monitoring to recognize and understand cost variances
- Recording appropriate cost changes in the cost baseline
- Controlling and documenting changes to the cost baseline as they occur
- Preventing unauthorized changes to the cost baseline

Cost Control Inputs

The project manager must rely on several documents and processes to implement cost control. These are as follows:

- **Cost baseline** is the expected cost that the project will incur. This is a time-phased budget which reflects the amount that will be spent throughout the project. Remember that the cost baseline is a tool used to measure project performance.

- **Change requests:** An analysis of the associated costs incurred to complete the proposed change is required when changes to the project scope are requested, in some instances; a change request may reduce the project cost such as removing a portion of the project deliverable.
- **Performance reports**focus on project cost performance, planned performance versus actual performance and project scope. The reports may vary according to stakeholder needs.
- **Cost management** Plandictates how cost variances will be managed.

Additional Planning

Planning is an iterative process. Throughout the project there will be demands for additional planning. An output of cost control is one of those demands. Consider a project that must be completed by a given date and that also has a set budget. The balance between the schedule and the cost must be kept. A large crew cannot be assigned to complete the project work by the project manager if the budget will not allow it. Through planning, the project manager must be as creative as possible to find an approach to accomplish the project without exceeding the budget.

The balance between cost and schedule is an on-going battle. Although it is usually easier to obtain more time than more money, this isnot always the case. Consider deadlines that cannot be moved, or the company perhaps facing fines and penalties, or a deadline that centres on a tradeshow, an expo, or the start of the school year.

Analysing the Cost Control Results

Throughout the project, cost control is an on-going process. The project manager must actively monitor the project for variances to costs. Specifically, the project manager always does the following:

- Monitors cost variances and then works out why variances have occurred
- Updates the cost baseline as needed based on approved changes
- Communicates to the appropriate stakeholders cost changes as they occur
- Maintains costs within an acceptable and agreed range.
- Works with the conditions and stakeholders to prevent unnecessary changes to the cost baseline.

Updating the Budget

Updating the budget is slightly different from revising a cost estimate. Budget updates allow changes to the cost baseline. The cost baseline is the “before project snapshot” of what the total project scope and the individual WBS components should cost. If the project scope grows, the cost is also likely to change to be able to fulfil the new scope. If a project undergoes drastic changes—due to false assumptions, large changes to the project scope, or new demands from the customer—it may be necessary to rebaseline the project cost. As it essentially resets the project, rebaselining is carried only in drastic changes. The project starts afresh after all historical information up to the rebaseline is cleared.

Further Reading:

- ✓ *Parviz F. Rad, (2002), Project Estimating and Cost Management*
- ✓ *Roman L. Weil, Michael W. Maher, (2005), Handbook of Cost Management*
- ✓ *Nigel J. Smith, (1995), Project Cost Estimating*