



Project Cost Management

Study Notes



Points To Note

- Please read Chapter 7 from Project Management Institute, A Guide to the Project Management Body of Knowledge, (*PMBOK® Guide*) – Fifth Edition, Project Management Institute, Inc., 2013 (pages 193-226)
- The study notes explain topics that are important for PMP® exam preparation, and you can expect several questions from these topics.
- It is very important to understand all the concepts discussed in this chapter; so, please pay close attention to all the terms used.
- Try to relate the concepts to real life examples.
- After reading the study notes, please answer the chapter test questions in this knowledge area. The chapter questions improve your understanding of the concepts discussed in the study notes.



What is Project Cost Management?

- *Processes involved in planning, estimating, budgeting, financing, funding, managing and controlling costs so that the project can be completed within the approved budget.
- Processes primarily concerned with the cost of the resources needed to complete the project activities.
- Processes associated with Project Cost Management include:
 - Plan Cost Management
 - Estimate Costs
 - Determine Budget
 - Control Costs

Please refer to *PMBOK® Guide* Fifth Edition, figure 7-1, page 194. This provides an overview of the processes in Project Cost Management.

*This definition is taken from the Glossary of the Project Management Institute, A Guide to the Project Management Body of Knowledge, (*PMBOK® Guide*) – Fifth Edition, Project Management Institute, Inc., 2013



Plan Cost Management

- *Process that establishes the policies, procedures and documentation for planning, managing expending, and controlling project costs.
- Component of the project management plan.
- **Provides guidance and direction on how the project costs will be managed throughout the project.
- The important inputs to the process are:
 - Project management plan
 - Project charter
- The tools and techniques used are:
 - Expert judgment
 - Analytical techniques
 - Meetings
- Output of this process is Cost management plan.

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Cost Management Plan

- *A component of a project or program management plan that describes how cost will be planned, structured, and controlled.
- The cost management processes and their associated tools and techniques are documented in the cost management plan.
- It can establish units of measure, level of precision, level of accuracy, organizational procedures links, control thresholds, and rules of performance measurement.

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Estimate Costs

- *The process of developing an approximation of the monetary resources needed to complete project activities.
- It determines the amount of cost required to complete project work.
- Cost estimate is a quantitative assessment of the likely costs for resources required to complete the activity.
- **Cost estimates are a prediction based on the information known at a given point in time. It should be reviewed and refined during the course of the project.
- Estimate Costs process identifies and considers costing alternatives to initiate and complete the project.
- The accuracy of estimation of costs increases as the project progresses through its life cycle.
- Process outputs are:
 - Activity cost estimates
 - Basis of estimates
 - Project document updates
- Differs from pricing: Pricing is what the seller charges for their products or services whereas costs are what the manufacturer incurs for manufacturing those products or rendering those services.

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**Project Management Institute, A Guide to the Project Management Body of Knowledge, (*PMBOK® Guide*)– Fifth Edition, Project Management Institute, Inc., 2013, Page 201



Estimate Costs – Tools and Techniques

- Expert judgment
- Analogous estimating
- Parametric estimating
- Bottom-up estimating
- Three-point estimating
- Reserve analysis
- Cost of quality (COQ)
- Project management software
- Vendor bid analysis
- Group decision-making techniques

For details, please refer to *PMBOK® Guide* - Fifth Edition, pages 204-207



Analogous Estimating (Top Down)

- Uses the actual cost of a previous, similar project as the basis for estimating the cost of the current project.
- Frequently used to estimate total project costs when there is a limited amount of detailed information about the project
- Uses historical information and expert judgment
- Generally is less costly, less time consuming but less accurate than other techniques
- Can be applied to a total project or to segments of a project
- Provides reliable information when:
 - Previous projects are similar in fact and not just in appearance.
 - Project team members preparing the estimates have the needed expertise.



Bottom-Up Estimating

- Method of estimating a component of work.
- Estimates the cost of individual activities or work packages to the greatest level of specified detail.
- Summarizes by rolling up the individual estimates to get a project detail.
- Summarizes or rolls up detailed costs to higher levels for further reporting and tracking.
- The level of accuracy and the cost estimate varies, depending on the size and complexity of the individual activity or work package.



Parametric Estimating

- *An estimating technique in which an algorithm is used to calculate cost or duration based on historical data and project parameters.
- Produces higher levels of accuracy based on the data and the sophistication built into the model.
- Can be applied either to a total project or to segments of a project, in conjunction with other estimating methods.

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Three-Point Estimating

- * A technique used to estimate cost or duration by applying an average of optimistic, pessimistic, and most likely estimates when there is uncertainty with the individual activity estimates.
- Optimistic, most likely, and pessimistic estimates clarify the range of uncertainty of the cost estimates.
- Technique helps in improving the accuracy level of the cost or duration estimates, when the underlying activity or cost component is uncertain.
- Originated with PERT (Program evaluation and review technique). PERT uses this method of estimating to define the range for an activity's cost.
- **The two commonly used formulae for calculating the expected cost, E , are triangular and beta distribution formula, which are given below:
 - *Beta Distribution formula: $E = (O + 4M + P) / 6$*
 - *Triangular Distribution formula: $E = (O + M + P) / 3$*

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Activity Cost Estimates

- *The projected cost of the schedule activity that includes the cost of all resources required to perform and complete the activity, including all cost types and cost components.
- Quantitative assessments of the probable costs required to complete project work.
- Estimate the costs for all resources –direct labor, materials, equipment, services, facilities, information technology, and special categories such as an inflation allowance, cost of financing or a cost contingency reserve.
- Indirect costs, if included in the project estimate, can be included at the activity level or higher levels.

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AACE – Types of Estimates

- AACE has identified five types of estimates of construction costs during Engineering
 - Order of Magnitude
 - Conceptual
 - Preliminary
 - Definitive
 - Control

Estimate	% Variance
Order Of Magnitude	- 50% to +50%
Budgetary Estimates	- 15% to +25%
Definitive Estimates	- 5% to +10%



Determine Budget

- *The process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.
- Determines the cost baseline against which project performance can be monitored and controlled.
- The cost baseline is the approved project budget, but excludes management reserves.
- Project budgets constitute all the funds authorized to execute the project.
- Main outputs of this process are:
 - Cost Baseline
 - Project Funding Requirements

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Project Schedule and Resource Calendars

Project Schedule:

- Part of the project management plan.
- Includes planned start and finish dates for the project's activities, milestones, work 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.

Resource Calendars:

- Provides information on which 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.



Cost Baseline

- *The approved version of the time-phased budget, excluding any management reserves, which can be changed only through formal change control procedures and is used as a basis for comparison to actual results.
- Developed by summing up the approved budgets by time period and is typically displayed in the form of an S-curve.

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Revised Cost Estimates, Budget Updates, Re-baselining

- Revised cost estimates
 - Modification to the cost information used to manage the project
 - May or may not require adjustments to other aspects of the project plan
- Budget updates
 - Special category of revised cost estimates
 - Changes to an approved cost baseline
- Re-baselining
 - Process of redefining the cost performance/schedule/performance measurement/technical baseline.
 - If cost variances are very severe, re-baselining will be done to provide a realistic measure of performance.



Control Costs

- *The process of monitoring the status of the project to update the project costs and managing changes to the cost baseline.
- Provides the means to recognize variance from the plan in order to take corrective action and minimize risk.
- Any increase to the authorized budget can only be approved through the Perform Integrated Change Control process.
- Cost control efforts involve analyzing the relationship between the funds that have been utilized and the physical work accomplished for such expenses.
- For effective cost control, one must be able to manage the approved cost baseline and the changes to that baseline.
- Important outputs are:
 - Work performance information
 - Cost forecasts
 - Change requests
 - Project Management Plan Updates

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Control Costs – Tools and Techniques

- Earned Value Management (EVM)
 - *A methodology that combines scope, schedule, and resource measurements to assess project performance and progress.
 - Commonly used method to measure performance.
 - The EVM principle is applicable to all projects, in all industries.
 - Planned Value (PV): *Authorized budget assigned to scheduled work
 - Earned Value (EV): *The measure of work performed expressed in terms of budget authorized for that work
 - Actual Cost (AC): *The realized cost incurred for the work performed on an activity during a specific time period.
- Forecasting
 - *An estimate or prediction of conditions and events in the project's future based on information and knowledge available at the time of the forecast.
- To-Complete Performance Index (TCPI)
 - *A measure of the cost performance that is required to be achieved with the remaining resources in order to meet a specified management goal, expressed as the ratio of the cost to finish the outstanding work to the remaining budget.

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Control Costs – Tools and Techniques (continued...)

- Performance Reviews
 - *A technique that is used to measure, compare, and analyze actual performance of work in progress on the project against the baseline.
 - It compares cost performance over time, schedule activities or work packages overrunning and under running the budget, and estimated funds needed to complete work in progress.
- Project Management Software:
 - Used to monitor PV, EV, and AC so as to display graphical trends.
- Reserve Analysis:
 - *An analytical technique to determine the essential features and relationships of components in the project management plan to establish a reserve for the schedule duration, budget, estimated cost, or funds for a project.

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