

Project Cost Management

Information Technology Project Management, Ninth Edition

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The Importance of Project Cost Management

- IT projects have a poor track record for meeting budget goals
 - Cost overrun is the additional percentage or dollar amount by which actual costs exceed estimates

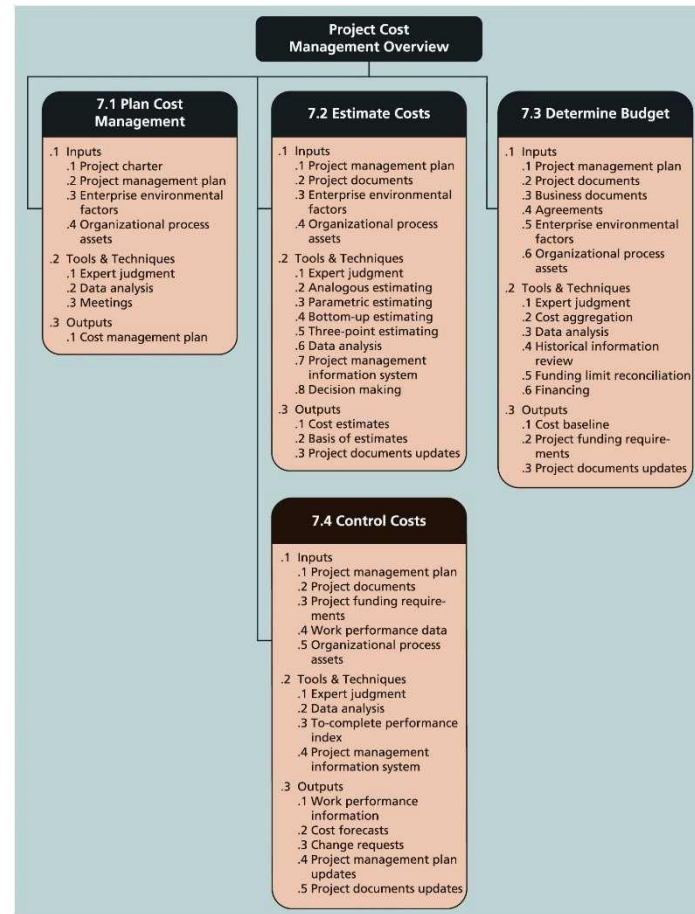
What is Cost?

- Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange
 - Usually measured in monetary units like dollars that must be paid to acquire goods and services

What is Project Cost Management? (1 of 2)

- Project cost management includes the processes required to ensure that the project is completed within an approved budget
 - Planning cost management: determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost
 - Estimating costs: developing an approximation or estimate of the costs of the resources needed to complete a project
 - Determining the budget: allocating the overall cost estimate to individual work items to establish a baseline for measuring performance
 - Controlling costs: controlling changes to the project budget

What is Project Cost Management? (2 of 2)



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FIGURE 7-1 Project cost management overview

Basic Principles of Cost Management (1 of 2)

- Most members of an executive board better understand and are **more interested in financial terms than IT terms**; they need to be able to present and discuss project information in both
 - Profits: revenues minus expenditures
 - Life cycle costing: considers total cost of ownership, or development plus support costs, for a project

Basic Principles of Cost Management (2 of 2)

- Types of costs and benefits
 - Tangible costs or benefits are those costs or benefits that an organization can easily measure in dollars
 - Intangible costs or benefits are costs or benefits that are difficult to measure in monetary terms
 - Direct costs are costs that can be directly related to producing the products and services of the project
 - Indirect costs are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project
 - Sunk cost is money that has been spent in the past; when deciding what projects to invest in or continue, you should not include sunk costs

Planning Cost Management

- The first step in project cost management is planning how the costs will be managed throughout the life of the project
 - The project team uses expert judgment, analytical techniques, and meetings to develop the cost management plan
- Cost management plan includes:
 - Level of accuracy
 - Units of measure
 - Organizational procedure links
 - Control thresholds
 - Rules of performance measurement
 - Reporting formats
 - Process descriptions

Estimating Costs (1 of 3)

- Project managers must take cost estimates seriously if they want to complete projects within budget constraints
 - Types of cost estimates
 - Tools and techniques for estimating costs
 - Typical problems associated with IT cost estimates

Estimating Costs (2 of 3)

| Type of Estimate | When Done | Why Done | Typical Range |
|--------------------------------|---|---|----------------|
| Rough order of magnitude (ROM) | Very early in the project life cycle, often 3–5 years before project completion | Provides estimate of cost for selection decisions | -50% to + 100% |
| Budgetary | Early, 1–2 years out | Puts dollars in the budget plans | -10% to +25% |
| Definitive | Later in the project, less than 1 year out | Puts dollars in the budget plans | -5% to +10% |

Estimating Costs (3 of 3)

- The number and type of cost estimates vary by application area
 - Estimates are usually done at various stages of a project
 - Should become more accurate as time progresses
 - It is important to provide supporting details for estimates and updates to project documents
 - A large percentage of total project costs are often labor costs

Cost Estimation Tools and Techniques

- Analogous or top-down estimates
 - Use the actual cost of a previous, similar project as the basis for estimating the cost of the current project
- Bottom-up estimates
 - Involve estimating individual work items or activities and summing them to get a project total
- Three-point estimates
 - Involve estimating the most likely, optimistic, and pessimistic costs for items
- Parametric estimating
 - Uses project characteristics (parameters) in a mathematical model to estimate project costs

Typical Problems with IT Cost Estimates

- Reasons for inaccuracies
 - Estimates are done too quickly
 - People lack estimating experience
 - Human beings are biased toward underestimation
 - Management desires accuracy

Determining the Budget (1 of 2)

- Budgeting involves allocating the project cost estimate to individual work items over time
 - Material resources or work items are based on the activities in the WBS for the project
- Important goal is to produce a cost baseline
 - Time-phased budget that project managers use to measure and monitor cost performance

Determining the Budget (2 of 2)

Surveyor Pro Project Cost Baseline Created October 10*

| WBS Items | Months | | | | | | | | | | | | Totals |
|--------------------------|--------|--------|--------|---------|---------|---------|---------|---------|---------|--------|--------|--------|-----------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 1. Project Management | | | | | | | | | | | | | |
| 1.1 Project manager | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 8,000 | 96,000 |
| 1.2 Project team members | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 144,000 |
| 1.3 Contractors | | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 6,027 | 66,300 |
| 2. Hardware | | | | | | | | | | | | | |
| 2.1 Handheld devices | | | | 30,000 | 30,000 | | | | | | | | 60,000 |
| 2.2 Servers | | | | 8,000 | 8,000 | | | | | | | | 16,000 |
| 3. Software | | | | | | | | | | | | | |
| 3.1 Licensed software | | | | 10,000 | 10,000 | | | | | | | | 20,000 |
| 3.2 Software development | | 60,000 | 60,000 | 80,000 | 127,000 | 127,000 | 90,000 | 50,000 | | | | | 594,000 |
| 4. Testing | | | 6,000 | 8,000 | 12,000 | 15,000 | 15,000 | 13,000 | | | | | 69,000 |
| 5. Training and Support | | | | | | | | | | | | | |
| 5.1 Trainee cost | | | | | | | | | 50,000 | | | | 50,000 |
| 5.2 Travel cost | | | | | | | | | 8,400 | | | | 8,400 |
| 5.3 Project team members | | | | | | | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 | 24,000 | 144,000 |
| 6. Reserves | | | | 10,000 | 10,000 | 30,000 | 30,000 | 60,000 | 40,000 | 40,000 | 30,000 | 3,540 | 253,540 |
| Totals | 20,000 | 86,027 | 92,027 | 172,027 | 223,027 | 198,027 | 185,027 | 173,027 | 148,427 | 90,027 | 80,027 | 53,567 | 1,521,240 |

*See the lecture slides for this chapter on the Instructor website for a larger view of this and other figures in this chapter. Numbers are rounded, so some totals appear to be off.

FIGURE 7-4 Surveyor Pro project cost baseline

Controlling Costs

- Activities involved in controlling project costs
 - Monitoring cost performance
 - Ensuring that only appropriate project changes are included in a revised cost baseline
 - Informing project stakeholders of authorized changes to the project that will affect costs
- Several tools and techniques assist in project cost control
 - Expert judgment, data analysis, project management information systems, and the to-complete performance index

Earned Value Management (EVM)

- Project performance measurement technique that integrates scope, time, and cost data
 - Given a baseline (original plan plus approved changes), you can determine how well the project is meeting scope, time, and cost goals
- Earned value management involves calculating three values for each activity or summary activity from a project's WBS
 - Planned value- describes the value in dollars of any work scheduled to be completed
 - Actual cost- is the budget that has been consumed to date
 - Earned value-describes the value in dollars of any work completed so far

Earned Value Management (EVM)

| Activity | Week 1 |
|----------------------------------|---------|
| Earned value (EV) | 5,000 |
| Planned value (PV) | 10,000 |
| Actual cost (AC) | 15,000 |
| Cost variance (CV) | -10,000 |
| Schedule variance (SV) | -5,000 |
| Cost performance index (CPI) | 33% |
| Schedule performance index (SPI) | 50% |

Table 7-3 Earned value calculations for one activity after week 1

Earned Value Management (EVM)

| Term | Formula |
|----------------------------------|---|
| Earned value (EV) | $EV = PV \text{ of all completed work}$ |
| Cost variance (CV) | $CV = EV - AC$ |
| Schedule variance (SV) | $SV = EV - PV$ |
| Cost performance index (CPI) | $CPI = EV/AC$ |
| Schedule performance index (SPI) | $SPI = EV/PV$ |
| Estimate at completion (EAC) | $EAC = BAC/CPI$ |
| Estimated to Complete (ETC) | $ETC = EAC - AC$ |

Table 7-4 Earned value formulas

Earned Value Management (EVM)

Schedule Variance (SV) - Will reveal if project is - ahead /on/ behind the schedule

$$SV = EV - PV$$

SV will be negative (i.e. achieved less than what planned) – Project is behind the schedule.

SV = 0 - project is on schedule the

SV = positive (i.e. achieved more than what planned) - project is ahead of schedule.

Schedule Performance Index (SPI) — it is the ratio between EV and PV, reflects whether the project work is ahead /on/ behind schedule.

$$EV/PV$$

SPI < 1 - project is behind schedule

SPI = 1 - project is on schedule

SPI > 1 - the project is ahead of schedule

Cost Variance (CV) — will reveal if the project is under/on/ over budget

$$CV = EV - AC$$

CV will be negative - project is over budget

CV = 0 - project is on budget

CV will be positive - project is under budget

Earned Value Management (EVM)

Cost Performance Index (CPI) — ratio between EV and AC reflects whether the project work is under/on/over budget in relative terms

$$\text{CPI} = \text{EV} / \text{AC}$$

CPI < 1 - project is over budget

CPI = 1 - project is on budget

CPI > 1 - project is under budget

Budget at Completion (BAC) — also known as the project/work budget, that is the total amount of money originally planned to spend on the project/work

Estimate at completion (EAC) — This is the variation into the actual final cost from the planned final cost. You calculate EAC based on the currently available data

Conditions when to use the formula to calculate EAC:

➤ The project will continue to spend at the same rate up to now.

Conditions- The delay is likely to continue (e.g. less skilled human capital will take more time to complete work)

➤ Future expenditures will occur at the original forecasted amount; that means no delays of same kind in future.

Conditions- The delay might be caused by some unforeseen reasons (e.g. natural calamities) which is not likely to happen again.

Earned Value Management (EVM)

- Important concepts

- Cost variance (CV) is the earned value minus the actual cost
- Schedule variance (SV) is the earned value minus the planned value
- Cost performance index (CPI) is the ratio of earned value to actual cost
- Schedule performance index (SPI) is the ratio of earned value to planned value
- Estimate at completion (EAC) is an estimated cost of completing a project based on performance to date
- To-complete performance index (TCPI) is a measure of the cost performance that must be achieved with the remaining resources to meet a specific goal

Using Project Management Software to Assist in Project Cost Management

- Spreadsheets are a common tool for resource planning, cost estimating, cost budgeting, and cost control
 - Many companies use more sophisticated and centralized financial applications software for cost information
- Project management software can increase a project manager's effectiveness during each process of project cost management
 - Many IT project managers use other tools to manage cost information because they do not know that they can use project management software, or they do not track costs based on a WBS, as most project management software does

Considerations for Agile/Adaptive Environments

- AgileEVM is an adapted implementation of EVM
 - Uses the Scrum framework artifacts as inputs, uses traditional EVM calculations, and is expressed in traditional EVM metrics
 - Requires a minimal set of input parameters
 - Actual cost of a project, an estimated product backlog, a release plan that provides information on the number of iterations in the release and the assumed velocity
 - All estimates can be in hours, story-points, team days or any other consistent estimate of size
 - The critical factor is that it must be a numerical estimate of some kind

Chapter Summary

- Project cost management is a traditionally weak area of IT projects
 - Project managers must understand several basic principles of cost management to be effective in managing project costs
- Main processes
 - Plan cost management
 - Estimate costs
 - Determine the budget
 - Control costs
- Several software products can assist with project cost management