Crosswind Learning

Crosswind Success Series: PMP® Exam Bootcamp Manual

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Chapter 12

Project Cost Management

Project Cost Management primarily entails the management of costs related to those resources required to complete the work of the project.

A strong secondary consideration is the impact that project decisions could have on the entire product life cycle, specifically the operational costs of the product. For instance, if a decision is made to decrease the time spent on testing, it is likely that support and maintenance costs will increase.

It is important to be aware that project costs may be measured differently, and at different times, by different stakeholders. For instance, acquisition cost may be measured at the time the decision is made, at the time the order is placed, at the time the item is received, or at the time the cost is actually incurred.

Successful performance on the Project Cost Management section of the test requires:

- A familiarity with the basic financial terms and concepts listed in sections 12.1 through 12.9
- A solid understanding of earned value analysis through the utilization of memorization tools and the information in section 12.14
- A knowledge of the basic calculations listed in sections 12.14 and 12.15
- An adherence to the three rules applicable to algebraic formulas
    Rule 1: First, perform any calculations inside parentheses
    Rule 2: Next, perform all multiplications and divisions, working from left to right
    Rule 3: Finally, perform all additions and subtractions, working from left to right

Tailoring

Project tailoring, the manner in which processes of a knowledge area are exercised, is employed to address the distinctive nature of each project. Successful project tailoring is predicated on a careful consideration of:

- Knowledge management
- Estimating and budgeting
- Earned value management
- Use of the Agile approach
- Governance

Agile/Adaptive Environment

Agile methods are typically applied to projects with high degrees of uncertainty and these may not benefit from detailed cost calculations. Instead, estimation methods are utilized to create high-level forecasts of project resource costs.

For projects with high degrees of uncertainty and firm budgets, scope and schedule are typically adjusted rather than cost.

In this chapter, we discuss the following:
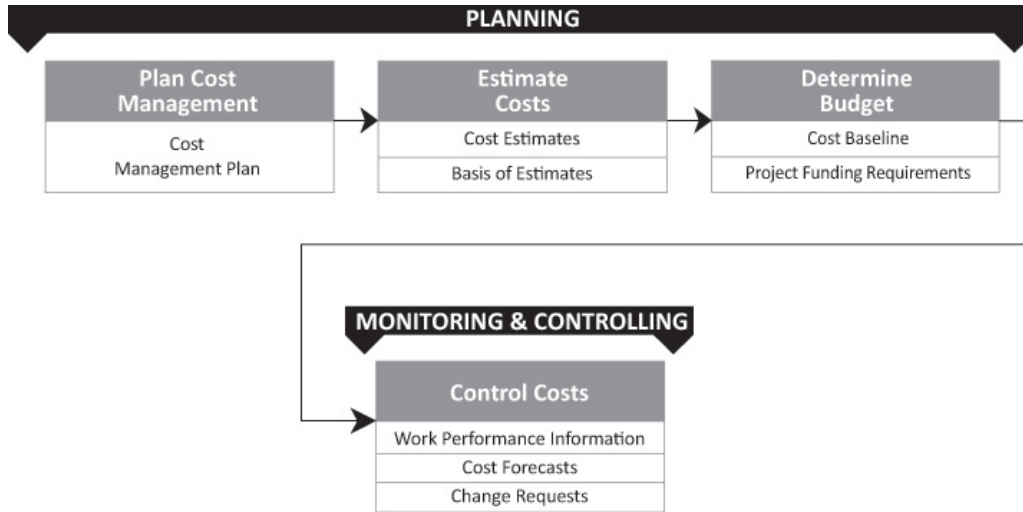
Figure 12-1: Cost Processes

☑ Crosswind "Must Knows" for Project Cost Management

	Key Inputs, Tools & Techniques, and Outputs for Plan Cost Management
	Key Inputs, Tools & Techniques, and Outputs for Estimate Costs
	Key Inputs, Tools & Techniques, and Outputs for Determine Budget
	Key Inputs, Tools & Techniques, and Outputs for Control Costs
	How to recognize the types of cost and how to differentiate between variable direct, variable indirect, fixed direct, and fixed indirect
	How to recognize cost-based selection techniques: return on investment (ROI), internal rate of return (IRR), net present value (NPV), benefit cost ratio (BCR), opportunity cost, and payback period
	What return on investment (ROI) represents and how it is used in project selection
	What internal rate of return (IRR) represents and how it is used in project selection
	What net present value (NPV) represents and how it is used in project selection
	What benefit cost ratio (BCR) represents and how it is used in project selection
	The principles of opportunity cost

☐	The principles of the payback period
☐	The principles of sunk cost
☐	The characteristics of standard depreciation and accelerated depreciation
☐	The principles of life cycle costing
☐	The characteristics and formulas related to earned value management (EVM), cost variance (CV), cost performance index (CPI), to-complete performance index (TCPI), schedule variance (SV), and schedule performance index (SPI)
☐	Earned value management triangle
☐	Earned value forecast table
☐	TCPI - CPI Similarities

Although helpful, this list is not all-inclusive in regard to information needed for the exam. It is only suggested material that, if understood and memorized, may increase your exam score.

12.1.   Types of Cost

There are four types of cost on a project: direct, indirect, fixed, and variable. They may be combined by mixing direct or indirect with fixed or variable (e.g. fixed direct cost).

A direct cost is a cost that relates directly to the project. An indirect cost is a cost that does not relate directly to the project.

A fixed cost is a cost that can be consistently forecasted independent of project activity. A variable cost is a cost that changes based on project activity**.**

> Understand the types of cost well enough to recognize them on the exam.
>
> Learn how to differentiate between variable direct cost, variable indirect cost, fixed direct cost, and fixed indirect cost.

Type	Definition
Direct Cost	Direct cost is cost that is directly attributable to the project and is **incurred as a result of project work.** An example is the salaries of coders on a software project.
Indirect Cost	Indirect cost is cost that is not directly attributable to the project, but often allocated to the project. Such a cost could be security for the building where the work of the project is performed.
Fixed Cost	Fixed cost is cost that is **consistent throughout the project life cycle regardless of project activity. The leasing of office space for a software project is a fixed cost.**
Variable Cost	Variable cost is cost that **fluctuates with project activity.** The cost of tile for a project to build twenty designer homes fluctuates depending on the materials selected by the homebuyers.

12.2. Cost-based Project Selection Techniques

There are many project selection techniques that can be utilized to ensure that the organization makes prudent selection decisions.

While these techniques are financial, there is no need to take accounting courses or perform a multitude of calculations for the exam.

> Recognize the cost-based selection techniques, know what they represent, and know which project to select if given a choice of multiple projects with the particular type of data.

Project Selection Technique Name	Also Known As	Option to elect	Example
Return on Investment	ROI	Largest number or percentage	$50,000 or 7%
Internal Rate of Return	IRR	Largest percentage	15.50%
Net Present Value	NPV	Largest number (years are already factored in)	$47,500
Benefit Cost Ratio	BCR	Largest ratio	3.5:1
Opportunity Cost	---	The value of the opportunity not selected	If Project A ($57,000) is selected rather than Project B ($55,000), the opportunity cost is $55,000
Payback Period	---	Shortest duration	Seven months

The following table provides shortcuts for memorization and understanding.

Technique	Discussion
Return on Investment (ROI)	Return on investment (ROI) may be calculated using a variety of formulas. In the case of ROI and project selection, typically, select the project with the **largest ROI (number** or **percentage)**.

> Know what ROI represents and how it is used in project selection.

Technique	Discussion
Internal Rate of Return (IRR)	Often used in capital budgeting, the interest rate makes the **net present value of all cash flow equal to zero**. In the case of IRR and project selection, **select the project with the highest IRR**.
Net Present Value (NPV)	Net present value, used in capital budgeting, is calculated by subtracting the present value of cash inflows from the present value of cash outflows. NPV **compares the value of a dollar today versus the value of that same dollar in the future, after taking inflation and discount rate into account.** Although it's unlikely the exam will ask you to calculate this value, you should know how to select a project based on NPV. For example, if Project A has an NPV of $150,000 and six months and Project B has an NPV of $295,000 and one year, select Project B because it has **the larger NPV AND** the **years are already factored into the dollar amount**. Generally, NPV represents income and expenses over time. If the expenses include capital acquisitions, capital **COULD** be included in NPV functionality.
Benefit Cost Ratio (BCR)	Benefit cost ratio is an analysis technique that compares the **benefit** to the **cost** of the initiative. If the BCR is 3.65:1, the benefits of the project outweigh the costs 3.65 to 1. If a related exam question includes a reference to profit, profit is a distracter. **The benefit, cost, and ratio are the main components.** For example, if a project has a BCR of less than one (0.75:1), each dollar invested only results in a value (benefit) of 75 cents and you would not approve that project. Note that projects that are necessary (e.g. due to regulatory compliance) would be approved despite such a BCR. **Be prepared to calculate a BCR**. Divide revenue by cost and apply the quotient to 1. For example: $200,000 in revenue and $50,000 in cost have a BCR of 4:1.

Know what IRR represents and how it is used in project selection.

Know what net present value (NPV) represents and how it is used in project selection.

Understand and know how to calculate the benefit cost ratio (BCR).

Technique	Discussion
Opportunity Cost	**Opportunity cost is the cost of taking one opportunity over another.** It is the cost of the opportunity that is not selected (the opportunity left on the table). For example, if a person accepts a $75,000 a year job in lieu of a $60,000 a year job, the opportunity cost of taking the $75,000 job is $60,000.
Payback Period	Payback period is the **amount of time needed** to earn back the original investment. If the payback period is the priority, select the project with the **shortest payback period**.

Know the principles of opportunity cost.

Know the principles of the payback period.
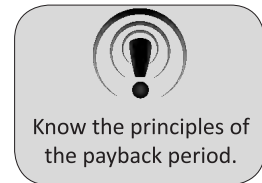
12.3. Future Value (FV)

Future value is the value of something at a specific point in the future.

The certification candidate should focus on understanding the concept of future value, rather than the calculation. As an example: the exam may ask you to determine if the future value of the money at a certain interest rate would be more than the current amount or less than the current amount. It's reasonable to expect a question with an incomplete formula (missing one or more components). In that case, "not enough information" is the best answer.

The future value formula shown below has four variables, with PV representing the present value, r representing the interest rate, n representing the number of periods, and FV representing the future value.

$$FV = PV \times (1 + r)^n \qquad \text{For Example, } \$1,000 \times (1 + 0.08)^3 = \$1,259.71$$

12.4. Present Value (PV)

Present value is the amount that must be invested today to realize an expected value in the future.

The candidate should focus on understanding the concept of present value, rather than the calculation. It's reasonable to expect a question with an incomplete formula (missing one or more components). In that case, "not enough information" is the best answer.

The present value formula, shown below, has four variables with PV representing the present value, r representing the interest rate, n representing the number of periods, and FV representing the future value.

$$PV = \frac{FV}{(1+r)^n} \qquad \text{For Example, } \$1984.58 = \frac{\$2500}{(1+0.08)^3}$$

NOTE: The exam may use PV to represent both present value and planned value. Present value is used to measure an investment; planned value is used with earned value management to measure the amount of work that should have been done at a specific point of time on the project.

12.5. Sunk Cost

Sunk cost represents the cost that has already been spent on a project.

Sunk cost is not considered when making future project decisions. For example: if a project has a budget of $175,000 and has already spent $200,000, the $200,000 is not a consideration in deciding if the project should be continued.

Know the principles of sunk cost.

12.6. Depreciation

Depreciation is the process of devaluing a capital asset in the tax system. Capital assets are those that are purchased and depreciated over time. Examples of capital assets include office equipment, vehicles, and technology infrastructure. When using depreciation over a period of time (schedule), an asset's worth decreases until it has no value or a predefined value at the end of its depreciation schedule. Generally, calculating depreciation is complicated, involving tables, formulas, and more.

Know what standard depreciation and accelerated depreciation are.

Although the exam does not involve any complex calculations related to depreciation, it is important that the candidate understands standard depreciation and accelerated depreciation and knows how to calculate a basic depreciation situation.

12.6.1. Standard Depreciation (Straight Line Depreciation)

Standard depreciation is a simple calculation. To calculate standard depreciation for the exam, the candidate must know:

- The initial value or purchase price of the item being depreciated
- The scrap value of the item being depreciated
- The depreciation timeframe

One example is a $5,000 video editing system that has a five-year depreciation schedule with a scrap value of $0. To determine the annual depreciation, the value of the item being depreciated must be divided by the number of years it will depreciate: $5,000 / 5 = $1,000 annual depreciation.

Another example is a $10,000 copier that has a four-year depreciation schedule with a scrap value of $2,000. Since the full initial value or purchase price will not be depreciated, the amount that will be depreciated must be established: $10,000 - $2,000 = $8,000. Then the amount being depreciated must be divided by the number of years it will depreciate: $8,000 / 4 = $2,000 annual depreciation.

12.6.2. Accelerated Depreciation

Accelerated depreciation is a little more complex and generally requires tables of data to calculate.

The candidate needs to know that there are two main types of accelerated depreciation:

- Sum of the year's digits
- Double declining balance (DDB)

Accelerated depreciation does what its name implies; it **depreciates faster than standard depreciation.**

12.7. Life Cycle Costing (Total Cost of Ownership)

Life cycle costing (sometimes called Total Cost of Ownership or TCO) is the process of examining all costs associated with a project plus the product's operational costs (operational costs are costs associated with production, maintenance, and support of the product once the project is closed).

> Know the principles of life cycle costing.
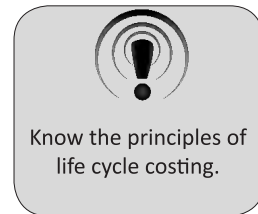
It is very important to consider the total cost of ownership when developing a project strategy. To decrease operational costs and/or extend the life of the product, it may be necessary to increase project costs.

As an example, the project was created to produce an electric automobile. A necessary component cannot be produced in-house. One vendor charges $50,000 to create a prototype of the component, and then charges $2,000 per component. Another vendor does not charge for the prototype, but charges $4,000 per component. The vendor with the higher upfront cost, but lower unit cost, is actually the more responsible choice because the organization will recognize a cost savings if at least 26 components will be produced.

	25 Devices	**30 Devices**
Vendor A	25 x $2,000 + $50,000 = $100,000	30 x $2,000 + $50,000 = $110,000
Vendor B	25 x $4,000 = $100,000	30 x $4,000 = $120,000

12.8. Fixed Formula Progress Reporting (Earned Value Rules)

Fixed formula progress reporting (sometimes called earned value rules) is a technique that creates a consistent status report for project activities. Instead of having a "gut feel" for the percentage of completion from each person on a project, this type of reporting is essentially binary. The project planning process defines the split of the percentages (for example, 25%/75% or 50%/50%).

This process works as follows:
- When an activity starts, it receives the initial percentage (for example, 25%)
- It receives the remaining percentage (for example, 75%) only when the activity is complete, thereby reporting 100% completion of the activity
- As the summary activities are rolled up to create cumulative percentages, they are based on the (as an example) 0%, 25%, or 100% status of each activity