Project Planning: Cost

Creating and Monitoring the Project Budget

This exercise aims to promote a practical understanding about how a budget for a project is created. Please note that software costing and software budgeting are two different things. Software costing is directed towards billing the client for a software development project. A software budget may be used as basis for software costing.

The WBS and Schedule plays a major role in creating the project's budget.

Consider the following tasks drawn from a project's WBS and the task duration estimates:

ID	Task	Immediate Predecessor (*)	Expected Duration
A	Gather Requirements		5
B	Write Software	A	20
C	Debug Software	B	5
D	Prepare draft manual	B	5
E	Review draft	D	5
F	Test Software	C,E	20
G	Make modifications	F	10
H	Finalize manual	G	10
I	Advertise	C,E	20

* all dependencies are assumed to be FS – Finish to Start

a. Create a PERT Diagram for the project tasks. Identify the critical path. Note that all dependencies are assumed to be FS. Create a Gantt Chart using the diagram in the workbook.

b. Identify resource needs for each of the tasks. Resources come in the form of personnel (manpower), equipment, supply, outsource company, among others. Of these resources, manpower is the most expensive. Indicate the resources you will need for the project and their corresponding cost in the worksheet Cost Estimate.

   By doing this activity, you will have already understood the requirements in terms of resources to accomplish a task.

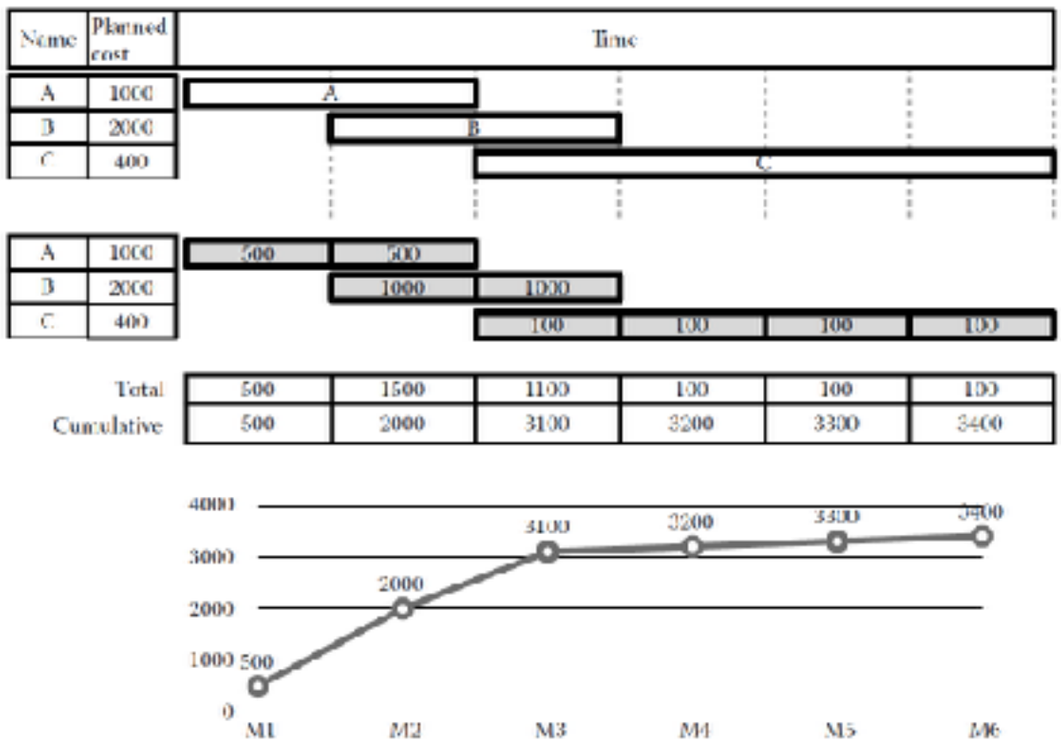
c. After identifying the resources needed, plan when your resources will be needed in the project. Following the order of the tasks, plot the costs that you will incur for the duration each task in the worksheet Report.

   We divide the cost of each task according to the project's reporting period. Note that in this project we produce a weekly report. Refer to the table in the Report worksheet. Each column in the table represents one week. For example, Gather Requirements has a duration of 5 days, or 1 week. It will cost the project 500 pesos to complete the task. Hence, in Wk 1 of the worksheet, a 500 cost will be reflected. Note that Write Software is a task that starts after Gather Requirements has completed. The cost associated with this task is therefore accrued in Wk 2 up to Wk 5 (20 days) at 2500 per week (total budget of 10,000).

   We then compute the cumulative costs, by summing planned expenditure week by week.

This activity allows you to identify the Planned Value of each task in its duration. By doing this activity, you would have already planned a schedule of expenses (budget) for your project. Since the PV shows the values of the costs of our plan, it provides a cost baseline of our project. If the project behaves exactly as we planned, the expenses we incur will follow exactly the profile defined by the PV.

Lesson: Planned value (PV) is the authorized budget assigned to work to be accomplished for an activity or WBS component. Total planned value for the project is also known as budget at completion (BAC)



Sample Computation of Planned Value

d. The table that you have created can be used to monitor the project's progress or performance. This analysis is called Earned Value analysis. To do this, the project manager needs to keep track of cost and task completion and reflect this in the monitoring tool.

First, we need to monitor Actual Cost. The actual costs (ACs) record the actual expenditures we incurred as the plan develops. ACs differ from PV for two reasons:

- Some activities might have actual start or end dates different from those scheduled.
- The actual effort and costs necessary to carry out an activity might be different from what was planned.

Comparing the PV and the ACs allows the project manager to understand how the actual plan is doing with respect to the plan defined at the project start. For instance, at any given time, we can tell whether we spent less or more than initially planned.

In the Report worksheet, reflect the following progress status at week 13:

ID	Task	Status	Actual Cost
A	Gather Requirements	100%	1500
B	Write Software	100%	9000
C	Debug Software	100%	2500

D	Prepare draft manual	100%	1000
E	Review draft	100%	1000
F	Test Software	100%	750
G	Make modifications		
H	Finalize manual		
I	Advertise	10%	1000

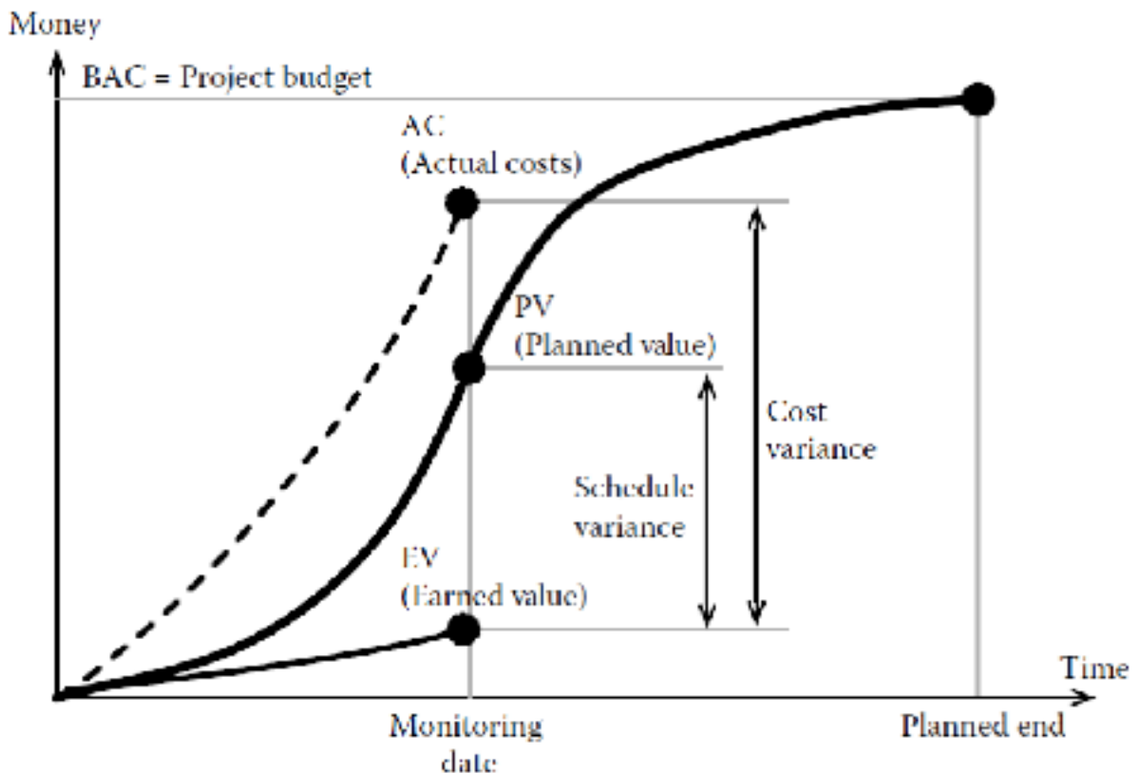
e. Compute for Earned Value. Earned value (EV) is the way in which we measure the technical progress of a project.

The EV of a plan is the sum of the EVs of its activities. Thus, when we complete a project, its EV will be the same as its PV. Similar to what happens with the ACs, in the ideal plan, the EV is an exact replica of the PV. However, during the actual execution of plans, we will have to take into account deviations from the ideal case.

In computing the EV, we are left with determining two other aspects: the first is when we accumulate EV and the second is how much we accumulate it over time. The answer to the first question is easy: EV is accounted as the actual work to produce it. Thus, the EV of an activity that has not yet started is 0, while the EV of a completed activity is equal to its PV.

The problem is what happens in between, namely, activities that are started but not yet finished. We could have EV progress linearly with the duration of an activity. Thus, an activity at 40% of its duration could have earned 40% of its PV. The method, however, takes a simpler approach. A percentage of the planned value is accounted when an activity starts; the remaining part is accounted for when the activity ends.

f. Analyze the project performance using the table. The figure below summarizes the different analyses that can be done in earned value management.



- Comparing PV and EV: The difference between PV and the EV at the monitoring date tells us whether we are late or early: if EV is above PV, then we are early (we realized more technical progress than expected); the opposite will be true if EV is less than PV. The difference between PV and EV is called **schedule variance.**

- **Comparing EV and ACs:** The difference between ACs and EV tells us whether we are underbudget and overbudget. This concept might be slightly less intuitive than the previous example and deserves a bit more explanation. Consider the case of an ideal plan: PV, EV, and ACs will overlap perfectly. Now, if we are spending a bit more than expected to achieve the planned technical progress, ACs will be a bit higher than EV and PV. Similarly, if we are underachieving, EV will be less than PV and ACs. The difference between EV and ACs is called **cost variance**.

- The cost performance index (or CPI) measures the efficiency with which we are earning value. It is computed as follows: CPI = EV/AC.

  Note that CPI > 1 if we are achieving technical progress more efficiently than we are spending. If the trend is maintained, the project will be underbudget. Conversely, if CPI < 1, we are inefficient and the project will run overbudget if no corrective action is taken.

- The schedule performance index (or SPI) measures the speed at which we are achieving technical progress. It is computed as follows: SPI = EV/PV.

  Note that SPI > 1 if we are achieving technical progress more efficiently than we planned. Else, the project is taking longer than planned.