



**Everyone's Smart
University**

Project Feasibility Study

Lecture 7

PMG201

Budgeting the Project

Learning outcomes

- 1. Methods of Budgeting**
- 2. Cost Estimating**
- 3. Improving Cost Estimates**
- 4. Budget Uncertainty and Risk Management**

Budgeting the Project

- ☐ Having finished the planning for the technical aspects of the project, there is one more important element of planning to finish that then results in the final go - ahead from top management to initiate the project.
- ☐ A budget must be developed in order to obtain the resources needed to accomplish the project ' s objectives. A budget is simply a plan for allocating organizational resources to the project activities.
- ☐ But the budget also serves another purpose: It ties the project to the organization ' s aims and objectives through organizational policy.

1- Methods of Budgeting

Top-Down Budgeting

Bottom-Up Budgeting

Methods of Budgeting cont ...

- ☐ Budgeting is simply the process of forecasting what resources the project will require, what quantities of each will be needed, when they will be needed, and how much they will cost.
- ☐ Most businesses and professions employ experienced estimators who can forecast resource usage with amazingly small errors. For instance, a bricklayer can usually estimate within 1 or 2 percent the number of bricks required to construct a brick wall of given dimensions. In many fields, the methods of cost estimation are well documented based on the experience of estimators gathered over many years.
- ☐ The cost of a building, or house, is usually estimated by the square feet of floor area multiplied by an appropriate dollar value per square foot and then adjusted for any unusual factors.

Methods of Budgeting

- ☐ Organizational tradition also impacts project budgeting. Every firm has its own rules about how overhead and other indirect costs are charged against projects.
- ☐ Next, we look at two different approaches for gathering the data for budgeting a project: top - down and bottom - up.

Top-Down Budgeting

- The top - down approach to budgeting is based on the collective judgments and experiences of top and middle managers concerning similar past projects. These managers estimate the overall project cost by estimating the costs of the major tasks, which estimates are then given to the next lower level of managers to split up among the tasks under their control, and so on, until all the work is budgeted

Top-Down Budgeting

- ✓ The advantage of this approach is that overall budget costs can be estimated with fair accuracy, though individual elements may be in substantial error.
- ✓ Another advantage is that errors in funding small tasks need not be individually identified because the overall budget allows for such exceptions. Similarly, the good chance that some small but important task was overlooked does not usually cause a serious budgetary problem.
- ✓ The experience and judgment of top management are presumed to include all such elements in the overall estimate. In the next section, we will note that the assumptions on which these advantages are based are not always true.

Top-Down Budgeting

- Based on managerial judgment, and historical data
- History can include actual costs from similar projects, adjusted for differences and for inflation
- Start at the top, and allocate down through the WBS

Pros and Cons of Top-Down Budgeting

- **Pros**

- Quick, simple
- Fair accuracy overall, though individual elements may be in error
- Small tasks need not be individually identified

- **Cons**

- Limited buy-in by junior managers
- Senior managers views may be biased
- Using data from dissimilar projects, or old projects, can mislead

Bottom-Up Budgeting

- In bottom - up budgeting, the WBS identifies the elemental tasks, whose resource requirements are estimated by those responsible for executing them (e.g., programmer - hours in a software project).
- This can result in much more accurate estimates, but it often does not do so for reasons we will soon discuss. The resources, such as labor and materials, are then converted to costs and aggregated to different levels of the project, eventually resulting in an overall direct cost for the project.
- The PM then adds, according to organizational policy, indirect costs such as general and administrative, a reserve for contingencies, and a profit figure to arrive at a final project budget.

Bottom-Up Budgeting

- **Bottom - up budgets are usually more accurate in the detailed tasks, but risk the chance of overlooking some small but costly tasks. Such an approach, however, is common in organizations with a participative management philosophy and leads to better morale, greater acceptance of the resulting budget, and heightened commitment by the project team. It is also a good managerial training technique for aspiring project and general managers.**

Bottom-Up Budgeting

- Unfortunately, true bottom - up budgeting is rare. Upper level managers are reluctant to let the workers develop the budget, fearing the natural tendency to overstate costs, and fearing complaints if the budget must later be reduced to meet organizational resource limitations. Moreover, the budget is upper management ' s primary tool for control of the project, and they are reluctant to let others set the control limits.
- Again, we will see that the budget is not a sufficient tool for controlling a project. Top - down budgeting allows the budget to be controlled by people who play little role in designing and doing the work required by the project. It should be obvious that this will cause problems — and it does.

Bottom-Up Budgeting

- **Starts at the bottom of the WBS, with the people who do the work**
- **Then costs are aggregated upward**
- **Overhead, project reserves, and profit have to be added in**

- **Project budgeting is a difficult task due to the lack of precedent and experience with unique project undertakings. Yet, understanding the organization ' s accounting system is mandatory for a PM. The two major ways of generating a project budget are top - down and bottom - up. The former is usually accurate overall but possibly includes significant error for low - level tasks. The latter is usually accurate for low - level tasks but risks overlooking some small but potentially costly tasks. Most organizations use top - down budgeting in spite of the fact that bottom - up results in better acceptance and commitment to the budget.**

2. Cost Estimating

Work Element Costing

The Impact of Budget Cuts

An Aside

Activity vs. Program Budgeting

Work Element Costing

- **The task of building a budget is relatively straightforward but tedious. Each work element is evaluated for its resource requirements, and its costs are then determined.**

Work Element Costing cont.

- **In some organizations, the PM adds the overhead charges to the budget. In others, the labor time and materials are just sent to the accounting department and they run the numbers, add the appropriate overhead, and total the costs. Although overhead was charged here against direct labor, more recent accounting practices such as activity - based costing may charge portions of the overhead against other cost drivers such as machine time, weight of raw materials, or total time to project completion.**

The Impact of Budget Cuts

- In the previous chapter on planning, we described a process in which the PM plans Level 1 activities, setting a tentative budget and duration for each. Subordinates (and this term refers to anyone working on the project even though such individuals may not officially report to the PM and may be “above” the PM on the firm’s organizational chart) then take responsibility for specifying the Level 2 activities required to produce the Level 1 task.
- As a part of the Level 2 specifications, tentative budgets and durations are noted for each Level 2 activity. The PM’s initial budget and duration estimates are examples of top - down budgeting. The subordinate’s estimates of the Level 2 task budgets and durations are bottom - up budgeting. As we promised, we now deal with combining the two budgets.

An Aside

- **Here and elsewhere, we have preached the importance of managers and workers who are willing to communicate with one another frequently and honestly when developing budgets and schedules for projects. Such communication is the exception, not the rule. The fact that only a small fraction of software development projects are completed even approximately on time and on budget is so well known as to be legend, as is the record of any number of high technology industries.**

Activity vs. Program Budgeting

- Traditional organizational budgets are typically *activity* oriented and based on historical data accumulated through an activity - based accounting system. Individual expenses are classified and assigned to basic budget *lines* such as phone, materials, fixed personnel types (salaried, exempt, etc.), or to production centers or processes. These lines are then aggregated and reported by organizational units such as departments or divisions.

Activity vs. Program Budgeting cont.

- **Cost estimating is more tedious than complex except where overhead and GS & A expenses are concerned. Thus, the wise PM will learn the organization ' s accounting system thoroughly. Low budget estimates or budget cuts will not usually be too serious for S - shaped life - cycle projects but can be disastrous for exponential life - cycle projects. Two kinds of project budget exist, usually depending on where projects report in the organization.**
- **Activity budgets show lines of standard activity by actual and budget for given time periods. Program budgets show expenses by task and time period. Program budgets are then aggregated by reporting unit.**

3.Improving Cost Estimates

- At the end of his “ *Don ’ t Accept Dictation,* ” reprinted above, McCarthy wrote “ Each person who has a task to do must own the design and execution of that task and must be held accountable for its timely achievement. Accountability is the twin of empowerment. ” If empowerment is to be trusted, it must be accompanied by accountability. Fortunately, it is not difficult to do this.

Improving the Process of Cost Estimation

- **There are two fundamentally different ways to manage the risks associated with the chance events that occur on every project:**
 - **The most common is to make an allowance for contingencies - usually 5 or 10 percent**
 - **Another is when the forecaster selects “most likely, optimistic, and pessimistic” estimates**

Funding Non profitable Projects

- **There are several reasons that firms would choose to fund a project that is not profitable:**
 - **To develop knowledge of a technology**
 - **To get the organization's "foot in the door"**
 - **To obtain the parts or service portion of the work**
 - **To be in a good position for a follow-on contract**
 - **To improve a competitive position**
 - **To broaden a product line or a line of business**

Learning Curves

- Studies have shown that human performance usually improves when a task is repeated
- In general, performance improves by a fixed percent each time production doubles
- More specifically, each time the output doubles, the worker hours per unit decrease to a fixed percentage of their previous value
- That percentage is called the *learning rate*
- The project manager should take the learning curve into account for any task where labor is significant

Other Factors

- Anywhere from about three-fifths to five-sixths of projects fail to meet their time, cost, and/or specification objectives
- There are several common causes:
 - Arbitrary and impossible goals
 - Scope creep
 - Wildly optimistic estimates in order to influence the project selection process
 - Changes in resource prices
 - Failure to include an allowance for waste and spoilage
 - Bad luck

Types of Estimation Error

- **There are two generic types of estimation error:**
 - **Random error** - where overestimates and underestimates are likely to be equal
 - **Bias** - a systematic error where the chance of overestimating and underestimating are not likely to be equal

Summary

- The intent of a budget is to communicate organizational policy concerning the organization's goals and priorities
- There are a number of common budgeting methods: top-down, bottom-up, and the program budget
- Firms will fund projects whose returns cover direct but not full costs in order to achieve long-run strategic goals of the organization

Summary

- If projects include repetitive tasks with significant human input, the learning phenomenon should be taken into consideration when preparing cost estimates
- The learning curve is based on the observation that the amount of time required to produce one unit decreases a constant percentage every time the output doubles

Summary

- **Other major factors, in addition to learning, that should be considered when making project cost estimates are inflation, differential changes in the cost factors, waste and spoilage, personnel replacement costs, and contingencies for unexpected difficulties**

4. Budget Uncertainty and Risk Management

Budget Uncertainty

Risk Management

Budget Uncertainty

- **In spite of the care and effort expended to create an accurate and fair budget, it is still only an estimate made under conditions of uncertainty. Because projects are unique, risk pervades all elements of the project, and particularly the project ' s goals of performance, schedule, and budget. We will discuss these issues of uncertainty and risk here, and offer some suggestions for dealing with them.**

Risk Management

- The field of risk management has grown considerably over the last decade. The Project Management Institute 's.
- In general, risk management includes three areas:

(1) risk identification

(2) risk analysis

(3) response to risk.

The process of accomplishing these three tasks is broken down into six sub processes:

Risk Management

1. ***Risk Management Planning*** developing a plan for risk management activities.
2. ***Risk Identification*** finding those risks that might affect the project.
3. ***Qualitative Risk Analysis*** evaluating the seriousness of the risk and the likelihood it will affect the project.
4. ***Quantitative Risk Analysis*** developing measures for the probability of the risk and its impact on the project.
5. ***Risk Response Planning*** finding ways of reducing negative impacts on the project as well as enhancing positive impacts.
6. ***Risk Monitoring and Control*** maintaining records of and evaluating the sub processes above in order to improve risk management.

- **In spite of the effort taken to make realistic budget estimates, it can still be useful to prepare for changes in the budget as the project unfolds. Such changes derive from multiple sources, including technology, economics, improved project understanding, and mandates. To the extent possible, it is best to try to include these contingencies in the contract in case they come to pass.**
- **Risk management consists of risk planning identification, qualitative and quantitative analysis, response, and monitoring. We deal with risk through such means as decision tables, simulation, and response, which entail identifying which risks will be prepared for and which will be ignored and simply accepted.**