

FinanceWeek

Cost Risk Analysis (2) Getting the estimates right

Accurately anticipating costs is essential for choosing the right projects, and avoiding budgetary surprises once they're under way. In the second of a three-part series, project management expert and trainer George Sifri looks at techniques for getting the best cost estimates before a project begins.



Estimating is a forecasting process used to guess costs, durations and the resources needed to complete a project. The process is typically used to establish the project baselines such as the budget and the duration. It is also used for other purposes such as:

Evaluating the economic feasibility of this project

- Evaluating between different projects and different projects' options to select the most optimum one that will maximize the delivery of business objectives
- Providing the basis for project cost and schedule control

If the project is over estimated, it may be abandoned as not economically attractive, and a genuine business opportunity to create value is lost. If it is under estimated and gets approved, it may result in cost overruns and schedule delays, leading frequently to project failures. Thus the accuracy of the estimate is essential for both project selection and project control.

Cost Estimation and Uncertainty

Estimating project costs attempts to forecast the future expenditures required to produce the project deliverables and achieve the project objectives. Despite being a highly quantitative field, the values provided by cost estimating are uncertain. An estimate is a possible or likely outcome, but not necessarily the actual outcome. This uncertainty arises because estimators do not have perfect information about future events. Also, assumptions underpinning estimates may not be accurate or well understood. Estimators make assumptions because of lack of information.

For example, the technical information is, at times, uncertain, undefined or unknown when estimates are prepared. The development of a new system may involve further uncertainty due to the use of unproven enabling or enhancing technologies, and optimistic assumptions can lead to extended development or the need to substitute alternative technologies. Future economic conditions are another example of uncertainty that cost estimators face. Wages for workers, financing costs, taxes, overhead rates and material cost may change as a result of conditions outside the control of the seller or buyer. Catastrophic events are another example of an uncertainty. Although they rarely occur, they may have material impact on final costs. Events such as a fire, strike, storm or power failure could considerably increase cost or delay the project.

The Three Critical Components of an Estimate

In a project, the accuracy of an estimate is highly impacted by the following three components:

- 1 The level of technical definition. What are we going to build or provide?
- 2 The level of development of the project execution plan. How are we going to build it?
- 3 The basis of the estimate. What are the assumptions that we made in order to develop the estimate?

The estimator should document the initial basis for any cost estimate at the time the estimate is prepared. The basis should describe or reference the purpose of the project, the scope's significant features and components, proposed methods of accomplishment, proposed project schedule, research and development requirements, special construction or operating procedures, site conditions and any other pertinent factors or assumptions that may affect costs.

Figure 3 shows examples of typical elements under each of the three components of an estimate.

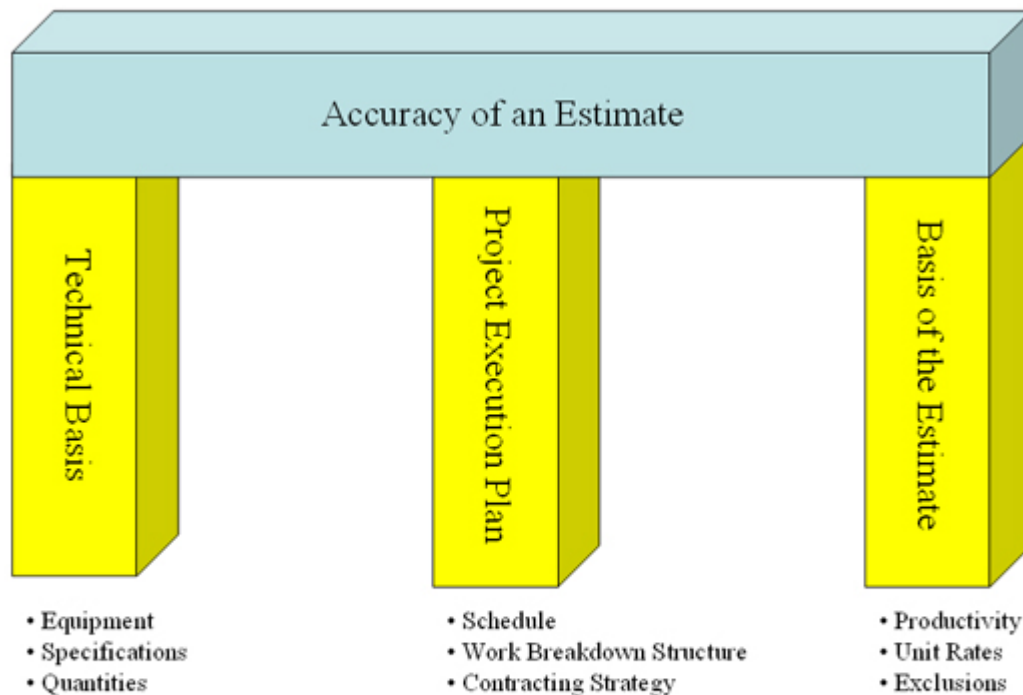


Figure 3: Components of an Estimate

Cost Estimates and the Project Life Cycle

The three components of an estimate (technical basis, project execution plan and basis of an estimate document) will be progressively elaborated as the project progresses from stage to stage. Cost estimates are required at various points in a project's life cycle for various purposes.

Cost estimating methodology should be consistent with the project phase and the degree of project definition. An appropriate cost-estimating methodology should be used, such as: bottoms-up, parametric, estimating models, expert opinion or market quotations. The estimating methodology should be clearly specified along with assumptions made for determining the cost estimates.

Determination of estimating methodology and approach is based on the level and availability of scope definition, level of development of project execution plan, resources required for developing the cost estimate and the required accuracy needed given the nature of the decisions at this stage and the consequences of these decisions. AACEI, Association for the Advancement of Cost Engineers International, divides estimates into five classes depending on their typical level of accuracy, methodology and application. Figure 4 shows the five classes of estimates as defined by AACEI in their "Cost Estimate Classification System Recommended Practice No. 17R-93" (see www.aacei.org).

ESTIMATE CLASS	Primary characteristic	Secondary Characteristic			
	LEVEL OF PROJECT DEFINITION Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical +/- range relative to best index [a]	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Screening or Feasibility	Stochastic or Judgment	4 to 20	1
Class 4	1% to 15%	Concept Study or Feasibility	Primarily Stochastic	3 to 12	2 to 4
Class 3	10% to 40%	Budget Authorization or Control	Mixed but Primarily Stochastic	2 to 6	3 to 10
Class 2	30% to 70%	Control or Bid/Tender	Primarily Deterministic	1 to 3	5 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Deterministic	1	10 to 100

Notes: [a] If the range index value of "1" represents +10/-5%, then an index value of 10 represents +100/-50%
 [b] If the cost index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%.

Figure 4: Classification of Estimates

As the project progresses from one phase to the next, cost estimates should reflect more definitive scope development for the near-term portions of work. This technique is often referred to as "rolling-wave" planning, where detailed planning of future work is done in increments or waves. For example, cost estimates early in a project's life may include:

- 1 Class 1: Definitive cost estimates and scope for more defined near-term work (e.g., the design and scope development phases)
- 2 Class 5: Order of magnitude cost estimates for the less defined long-term work (e.g., execution, construction, and project close-out phases)

About the author

A certified Project Management Professional, Dr. George Sifri delivers project management courses on five continents for some of the largest corporations in the world. He is also an instructor for ESI International (www.esi-emea.com), a global training consultancy.

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Author: George Sifri

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