



Why Even Well-Planned Projects Can Exceed Budget: The Role of Risk in Cost Estimating

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When a project exceeds its budget, the first question is often: “Was the estimate wrong?”

It may be surprising to learn, but in some cases, the answer is no.

Project owners generally expect construction cost estimates to deliver cost certainty and to take into account all anticipated project risks. Yet some risks fall outside the construction costs captured in an estimate and still need to be accounted for in the overall project budget. Too often, those costs are addressed by adding a standard percentage of the construction cost to the project budget as “contingency”. While straightforward, that boilerplate approach is not informed by the risks specific to that project. When those risks become reality, even a well-planned project with a sound construction estimate can face a budget shortfall.

Adding risk analysis to the estimating process does more than help determine an appropriate contingency amount. It communicates to a project team the risks driving that contingency, and it allows owners to prioritize and address some risks before they become cost or schedule impacts.

NOT ALL CONTINGENCY COVERS THE SAME THING

Every estimate carries uncertainty because it is a prediction of probable cost. The actual quantities, productivity, pricing, and other variables will rarely match an estimate exactly. Risk represents an uncertain event or condition that may occur and could affect a project objective.

If an estimate includes the removal of 100 cubic yards of soil, there is inherent uncertainty that the actual quantity will be something other than exactly 100 cubic yards. The project may also carry a risk that significantly more soil will need to be removed because subsurface conditions are unknown or geotechnical information is incomplete. Some variability in the quantity is expected; encountering conditions requiring substantially more excavation is a separate event that may or may not occur.

Most estimates account for some of this uncertainty through allowances and contingencies. Allowances cover known but undefined requirements, while contingency addresses uncertain conditions or events. In practice, however, contingency is often established using a predetermined percentage of project cost. That percentage may reflect past experience or organizational practice without accounting for project-specific and systemic risks, or the owner’s desired confidence level in completing the project within the available budget.

Design, estimating, and owner contingencies also serve different purposes. Design contingency accounts for scope that still needs to be developed. Estimating contingency reflects factors such as the estimator's assessment of the quality of the estimate and the cost information used to prepare it. Owner contingency addresses a broader set of costs and risks not covered within the construction estimate.

RISKS THAT MAY BE MISSING FROM THE PICTURE

Estimate classifications are useful for understanding an estimate's anticipated characteristics, particularly its level of project definition and the methodology used to prepare it. While estimate classifications are a piece of the puzzle, they do not capture the full risk picture. Their primary focus is on construction costs, not the owner's full budgetary needs.

Other characteristics of the project and the owner's organization could have cost implications. An owner may have limited experience with a particular delivery method, face challenges managing internal and external stakeholders, lack sufficient project management or project controls resources, or have an incomplete understanding of local regulations. Lengthy decision-making processes can also affect project cost and schedule.

Understanding these systemic risks gives the owner a better basis for deciding how much funding to set aside and where additional attention is needed as the project develops. In addition, project-specific risks can vary considerably across projects and further inform the appropriate level of contingency.

Project risk analyses show how significantly systemic and project-specific risks can affect contingency. Standard five-to-ten-percent owner contingencies can underrepresent the funding required to achieve an owner's desired level of confidence, leaving little room to respond to significant risks and a very low probability that the project can be completed within the original budget.

USING RISK ANALYSIS TO INFORM OWNER CONTINGENCY

Quantitative risk analysis (QRA) provides probabilistic results for the overall project cost by running many "what-if" scenarios with the available risk data. The resulting range of potential costs and confidence levels allows the owner to establish contingency based on its risk tolerance. Achieving a higher confidence level requires a higher overall budget, therefore informing the contingency amount needed to achieve the desired confidence level. A P80, for example, represents an 80% probability that the total project cost will be at or below that value.

The analysis also helps identify the risk drivers. Those risk drivers can vary considerably from project to project. Identifying those risk drivers early gives the team time to act upon and mitigate potential cost impacts. As project design progresses, geotechnical information will likely be available, a preliminary schedule will be further defined, or utility conflicts will be investigated. More importantly, some risks will be reduced or eliminated while others may emerge. Revisiting the analysis at estimate updates or project phase gates allows the owner to reevaluate contingency as the project itself becomes better defined.

Performing risk analysis early and revisiting it as the project develops allows the team to understand top risk drivers and manage them rather than simply carry funding. Estimators bring a useful perspective to this process. Their coordination with owners and designers and detailed review of plans and specifications provide a broad understanding of project requirements and potential gaps. Applying that knowledge to risks not captured in the construction estimate can help develop a more complete assessment of potential project costs without necessarily requiring a significant additional level of effort.

A construction estimate is always an essential part of project planning, but it does not account for all the project risks for an owner. Quantitative risk analysis plays an important role in determining the appropriate owner contingency to achieve the desired confidence level and establishing an overall project budget that is set up for success.

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