NAC Executive Insights

Contingency vs. Management Reserves

Key Points

- Contingency reserves are used to manage identified risks (known unknowns) and are calculated/estimated and linked to specific risks.
- Management reserves are used for unidentified risks (unknown unknowns) and are linked to an organization's policy and a project's level of uncertainty, and are often set as a percentage of project cost or duration.
- Contingency and management reserves are established both for cost and schedule.
- Small and medium sized projects and organizations often combine contingency and management reserves.
- Contingency reserves are under the control of the project manager or subordinate risk owners.
- Management reserves are only available to project managers for unidentified risks and with higher management approval.

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Introduction

Many senior level discussions for large, longer duration projects concern the appropriate levels of contingency and management reserves. A less than consistent understanding of what each of those terms mean and imply is often apparent. Recently, this same confusion around contingency and management reserves has been seen in one of the largest governmental programs underway. This lack of a consistent understanding and now the confusion expanding to governmental programs has triggered writing this Executive Insight.

What is Contingency?

Contingency or *contingency reserves* are associated with identified risks: known unknowns. Consider also that active risk management strategies are integrated into the project execution plan.

Separate contingency reserves should be determined for both cost and schedule. It is important, however, not to lose sight of the interrelationship between cost and schedule. Extending the schedule, for example, carries with it additional general conditions costs, as a minimum, as well as cost growth, which may result from more extensive site preparation and conditioning. This in turn will likely carry a schedule penalty. This is one example of how cost and schedule are highly correlated.

Contingency reserves are not randomly selected. They are part of the project's cost budget, and are calculated by any one of a number of different risk assessment techniques or methodologies. Importantly, it is the project manager who controls the contingency reserves. The project manager has full authority to use the contingency when a previously identified risk occurs. The project manager, either the owner's, program manager's, engineer's, or contractor's, may delegate authority for this reserve (or the actual reserve) to the owners of the risk. Ownership and control of contingency is often confused with the situation for management reserves, which are not controlled by the project manager.

In very large programs with multiple contractors and risk tiers, the sharing of risks between various tiers or parties can provide a shared focus on risk mitigation and resolution if the risk manifests.

What is Management Reserve?

Management reserve, in contrast to contingency or contingency reserve, is associated with *unidentified* risks. Think of these as unknown unknowns. Similar to contingency, management reserves should be established for both cost and schedule.

The same concerns about the correlation between cost and schedule apply to management reserves. Additional considerations enter as well. For example, a management reserve for schedule may be associated with a reduced market share for a commercial item. Similarly, cost growth above certain thresholds may require the owner to seek additional and potentially much more expensive financing. In either instance the financial viability of the project—its return on investment—may be impaired.

Management reserves are primarily determined by the organization's policies. While part of the project budget, these reserves are not part of the cost baseline. They also are not under the project manager's control, as noted above. They can only be released to the project manager when a true unknown unknown risk occurs that is not otherwise mitigated by contract or insurance.

In addition to an organization's policies, a key determinant in establishing the level of management reserve is the overall uncertainty associated with the project. Is it a first of a kind project? Does it involve work in a new country or work with a new technology? Or is it a routine project done multiple times for the same or similar clients in similar circumstances? Typically, management reserves for large, long duration projects tend to fall within the 5-15 percent range, dependent on project complexity. Management reserves are predominantly held at the owner level since unknown unknowns are usually retained by the owner.

Use of Management Reserve

Management reserve is not free money to the project. It is a sum of money that management wants to "take home," expending this reserve only if a true unknown unknown risk emerges and is not fully mitigated through other means. Management reserve is not available for cost overruns.

Neither is management reserve available for doing out-of-scope work or "gold plating" elements of the design or construction. Out-of-scope work and gold plating increase project risks and change baseline scope.

Project workarounds associated with known risks (such as delays in receipts of materials or quality driven rework) are handled by contingency, not management, reserve.

When an identified risk has been eliminated, the associated contingency is released to the project. On a previous project, released contingency was used to fund a performance incentive and strengthened management reserves (which meant additional profit was taken home).

Updating Contingency Reserves

Changes in project scope or requested execution changes (such as project acceleration) require changes to the project's cost and schedule baselines. These changes need to reflect any new risks that may result as well as any changes to contingency that arise.

Changes to the project baseline should be formally approved. Management reserve is not used to cover any of these changed costs or schedules. In conjunction with any baseline change, management reserve should be revisited. Has uncertainty increased or decreased? Did the changes improve alignment or contribute to any misalignment with the organization's policies?

How to Determine Contingency Reserves

There are several methodologies for establishing contingency reserves. These include:

- Monte Carlo analysis
- EMV – Expected Monetary Value
- Decision Tree analysis
- Percentage of project (or portion of project) cost

Monte Carlo analysis utilizes a simulation approach that yields a probability distribution for cost and time associated with a selected confidence level. It has been shown that large, long duration projects demonstrate "Fat Tails" (indicating a large skew in a normal distribution) and as such the modeling assumptions become very important. On large projects, Monte Carlo analysis is the preferred methodology for identifying probable cost. Correlation between activities and elements of cost or schedule can measurably impact developed contingency levels.

Expected Monetary Value (EMV) tends to use a pooled approach to contingency, with the entire quantum of the risk contingency reserve available to "pay out" for any risks encountered. In many ways EMV acts in a manner similar to an insurance policy, but with elevated risk if all identified risks occur. In EMV the probability of a given risk occurring is identified and multiplied by the cost or schedule impact. The total EMV sums these amounts across all identified risks. The deterministic method of EMV does not account for uncertainty or variability in either likely probability of occurrence or impact quantum. The

insurance pool analogy breaks down if too few risks have been identified or a significant fraction have high probabilities of occurrence. Contingency reserves often fall within the three to five percent range.

Decision Tree analysis is a graphical, quantitative risk analysis technique that considers probable choices and calculates EMV for each, selecting the most favorable.

Percentage of project cost typically falls between 3-10 percent based on perceived risk.

Summary

Contingency reserves represent important management tools to identify risks, proactively address them, communicate them to various project stakeholders, and improve project outcomes. Appropriate use of contingency and clear documentation of the realized risk and contingency consumed provide a strong basis for improving future estimates and schedules and in identifying lessons to be learned.

Estimated cost and associated contingency represent the cost performance baseline for the project. The same is true for schedule. Management reserve is not part of the project's performance baseline. When an identified risk is not realized, the provided contingency should be released.

The reader is guided to the Executive Insight on contingency for more information.

About the Author

Bob Prieto was elected to the National Academy of Construction in 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries.