MERCURY

Project Cost Estimating, Budgeting, and Value Engineering Skills

20 September – 1 October 2027
Washington DC (USA)

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Project Cost Estimating, Budgeting, and Value Engineering Skills

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Introduction:

The decision to proceed with a project is often based almost exclusively on early conceptual cost estimates, and these estimates provide the basis for the cash flow projections and budget forecasts used during the project feasibility study.

Unreliable cost estimates can result in significant cost overruns later in the project life when it is too late to contain them. As potential projects are considered, management not only requires cost estimates of high accuracy but also seeks opportunities to reduce lifecycle costs, improve budget accuracy, and optimize whole-life project value.

Determining which estimation method to use at each stage of project development depends on the information available during preparation and its desired accuracy. Besides, decisions regarding optimizing project costs without sacrificing quality or functionality depend on using systematic and logical procedures and techniques to enhance the whole-life project value.

This project cost estimation course will provide the delegates with the necessary skills for accurately estimating the total cost of their proposed projects, eliminating unnecessary expenses, linking cost estimates to selected procurement methods, and enhancing the overall value of project delivery.

The project cost estimation course offers a series of estimating techniques and processes to forecast accurately the anticipated costs of projects with a focus on budget estimates, estimates for pre-construction services, estimating contractor and subcontractor work, estimating general conditions, pricing self-performed work, estimating negotiated contracts and performing lump-sum and unit-price estimates.

The project cost estimation course also presents the value engineering methodology, emphasizing the return-on-investment aspect of decision-making regarding lifecycle costs during project planning, procurement, and execution. This methodology can identify alternative ideas/solutions to produce the client's best value requirements at any project phase.

This project cost estimation course significantly enhances cost estimating, budgeting, creative thinking, problem-solving, and informed decision-making skills within the project management context.

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Targeted Groups:

- Project managers.
- Project cost estimators.
- Cost controllers.
- Project planners.
- Contract professionals.
- Project procurement staff.
- Anyone interested in project initiation, project estimation budgeting, and development.

Course Objectives:

At the end of this project cost estimation course, the participants will be able to:

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- Gain knowledge of techniques used in project estimating, from the conceptual stage to the final detailed estimate.
- Understand the different types of estimates used to accurately and progressively estimate project costs.
- Understand the different types of contracts based on the distribution of risk between contracting parties.
- Apply incentive arrangements to get the best results from the agreement.
- Understand the fundamental concepts of Value Engineering and Analysis.
- Understand how value engineering supports effective project management by providing a continuous thread of good practice throughout the project development.
- Appreciate the level and nature of the information needed to develop a project scope.
- Gather and organize information and costs relevant to critical elements of the project.
- Learn how to capture and incorporate stakeholders' input in developing the project charter.
- Report effectively to top management and project stakeholders in the context of proposing alternatives that improve the overall project value.
- Demonstrate proficiency in applying life cycle costing principles.
- Present a convincing case in support of specific project alternatives.
- Integrate all relevant project elements into a cohesive and comprehensive cost estimate.
- Prepare budget estimates that will enable the owner-organization to make informed decisions as to the feasibility of a potential project.
- Compare the costs of alternative strategies or technical approaches to ensure the most economical project at the desired level of quality.
- Structure the contract compensation arrangement to provide the highest incentives to complete the project on schedule and within the determined budget.
- Keep accurate control of the progressive budgeting process based on the various design stages.
- Prepare accurate budget estimates through the programming phase, the schematic design phase, and finally, the design development phase
- Compare the costs of alternatives to ensure the most economical project at the desired level of quality.
- Understanding the most appropriate contracting structure to ensure the desired project results
- Apply proper risk analysis to mitigate risks at minimal costs effectively and to determine appropriate contingencies for residual risks.
- Obtain the skills required to prepare and manage the bidding process.
- Prepare lump-sum, unit-price, cost plus, and time-and-materials estimates and contracts.
- Keep accurate control of the progressive budgeting process based on the various design stages.
- Manage the interface between many value-adding project phases and management expectations.
- Apply systematic and innovative methodology with a multi-disciplinary approach to achieve better value and project cost optimization.

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Targeted Competencies:

At the end of this project cost estimation course, the target competencies will be able to:

- Skill and confidence to estimate project costs accurately and sidestep the most common cost-estimating pitfalls and problems.
- Developing an initial project budget for the owner.
- Determining project feasibility.
- Preparing bids and cost proposals.
- Determining the cost impacts of change orders.
- Preparing a schedule of values.
- Creating historical cost databases to improve future estimating accuracy.
- Bringing value engineering into the organization's project initiation and planning processes.
- Evaluating alternatives based on their cost and actual value throughout the project lifecycle.
- Identifying major roadblocks to thinking creatively about project challenges and ways to mitigate them.
- Assess the results of a brainstorming session to develop the best value-adding scenario for the project.

Course Content:

Unit 1: Cost Estimating Basics

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- The estimated life cycle.
- Phases of the design process:

  - Programming phase.
  - Schematic design.
  - Design development.
  - Construction documents.

- Estimating accuracy by phase.
- Conceptual cost estimates.
- Rough order of magnitude estimates broad scope estimates.
- Assemblies cost estimates.
- Cost indices.
- Semi-detailed estimates narrow scope estimates.
- Definitive estimates detailed scope estimates.
- Basic procedures.
- Lump-sum contracts.
- Unit-price contracts.
- Cost-plus contracts.
- Cost-plus contract with the Guaranteed Maximum Price GMP.
- Time-and-materials contracts.
- Bid method.
- Negotiated method.
- Quantity take-off.
- Types of construction contracts.
- Procurement methods.
- Pre-construction services.
- Risk analysis and contingencies.

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Unit 2: Broad Scope Cost Estimating Techniques:

- Adjustments to project cost for broad scope estimates.
- PERT project cost analysis.
- PERT unit cost estimates.
- Formulae for cost estimating.
- The standard distribution curve.
- Z-value table.
- The probability of project completion within budget.
- Estimating project unit cost by using the standard deviation.
- Evaluating the project unit cost at a required probability.
- The likelihood of completing the project at a required cost.
- PERT vs. standard deviation and Z-values.
- Adjustments to estimates based on previous projects.
- Adjustments for time.
- Review: Future value of money.
- Review: Present value of money.
- Equivalent annual interest rate.
- Index to adjust for time.
- Equivalent compound interest.
- Location index for construction.
- Adjustments for location.
- Adjustments for size.
- Combined adjustments.
- Economic price adjustment.
- Estimating durations based on the learning curve effect.
- Estimating costs based on the learning curve effect.
- Unit-cost adjustments.
- Learning curves.

Unit 3: Budget Estimating Process:

- Estimating by design phase.
- Programming budget estimates.
- Schematic design budget estimates.
- Design development budget estimates.
- Estimating pre-construction services.
- Request for proposal.
- Development of pre-construction services estimate.
- Pre-construction services contract.
- Budget control log.

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Unit 4: Bid Contract Estimating Process:

- Pre-estimate activities:

  - Estimating process.
  - Solicitation of lump-sum bids.
  - Order-of-magnitude estimates.
  - Work breakdown structure.
  - Estimating team.
  - Scheduling the estimating work.
  - Subcontractors and major suppliers.
  - Estimating forms.
  - Accuracy and error prevention.

- Pricing self-performed work.
- Recap sheet.
- Materials.
- Labor.
- Applying pricing factors.
- Summary recap.
- Subcontractor work.
- Project summary schedule.
- Alternative techniques.
- Elements of the estimate of the general condition.
- Final document review.
- Completing the bid summary.
- Final mark-ups.
- Sales tax.
- Validating the estimate.
- Estimating subcontractor work.
- Estimating general conditions.
- Completing the estimate.

Unit 5: Unit Price Estimates:

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- Unit price bid forms.
- Direct cost estimation:

  - Materials.
  - Labor.
  - Indirect labor.
  - Subcontractors.
  - Recap summary sheet.
  - Direct-to-indirect cost factor.

- Mark-up determination.
- Variation-in-quantity contract provision.
- Risk analysis.
- Bid finalization.

Unit 6: Negotiated Contract Estimating:

- Guaranteed maximum price estimates:

  - Contract procurement process.
  - Documents.
  - Strategies.
  - Estimating process.
  - Contingencies.

- Fee determination for negotiated contracts.
- Reimbursable versus non-reimbursable costs.
- Home office overhead.
- Risk evaluation.
- Fee structure.
- Cost savings split.
- Strategies for responding to the request for proposal.
- Documents are to be included with the request for proposal.
- General contractor interview and selection process.
- Negotiated subcontracts.
- Cost proposals for negotiated contracts.

Unit 7: Contract Types and Compensation Arrangements:

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- Risk distribution in contracting.
- Project risk profiles.
- Contract types according to risk distribution.
- Fixed price contracts:

  - Firm fixed price.
  - Fixed price with economic adjustment.

- Incentive contracts.
- Fixed price incentive.
- Cost plus incentive.
- Cost reimbursement.
- The cost plus the award fee.
- Cost plus a fixed fee.
- Cost-plus contracts.
- Time-and-materials.

Unit 8: Narrow Scope Cost Estimating Techniques:

- Power-sizing techniques capacity ratios.
- Factor estimates.
- Cost Estimating Relationships CER.
- Design-to-cost-estimates.
- Target cost estimates.
- Adjusting for project type and quality level.
- Features determining the quality level Grade of a structure.
- Adjusting for quality level by using a costing publication.
- Economic constraints.
- Parametric cost estimating.
- Analysis of estimating accuracy.

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Unit 9: Framework for Applying Value Engineering in Projects:

- What is value engineering? Why is it important?
- Defining value engineering concepts and principles.
- Purpose of value engineering and value analysis.
- Strengths and weaknesses of value engineering.
- How and when is value engineering applied?
- Project definition and initiation.
- Project scope and charter development.
- Lifecycle costing techniques.
- Project stakeholders analysis and management.
- Identifying relationships between value, cost, and worth.
- Initiating Value engineering process.
- Overview of different value engineering phases.
- The information phase - steps and procedures.
- Developing a value engineering job plan.

Unit 10: The Function Analysis Phase - Expressing Project Functional Needs and Constraints:

- The need for function analysis in projects.
- Defining project constraints - relationships and tradeoffs.
- Conceptual project cost estimating techniques.
- Function-cost-worth analysis.
- Developing FAST diagrams to identify critical project components.
- The technical FAST model to perform project value analysis
- Case study.
- Cross-functional project team approach.

Unit 11: The Creative Phase - Inspiring Creativity in Your Project Team:

- Creativity and Creative thinking within the project environment.
- Individual vs. group thinking to improve the quality of project decisions.
- Creativity techniques are applied to optimize project value.
- Blocks to creativity within the project team.
- Brainstorm project solutions.
- Reaching consensus and leveraging the power of project team collaboration.
- Project risk perception and identification.
- Project prioritization process using the "Delphi" technique.
- The use of force-field analysis in project problem-solving.
- Output of the creative phase.

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Unit 12: The Evaluation Phase -Making Informed Project Decisions:

- Project ideas screening.
- Project evaluation methods.
- Quantitative evaluation using objective data.
- Subjective evaluation - project-related criteria weighting.
- Revisiting project lifecycle costing analysis.
- Incorporating inflation in project economic analysis.
- Performing project risk and scenario analyses.
- Risk lifecycle simulation modeling - best and worst project cost scenarios.
- Pitfalls associated with the use of existing financial models.
- Incremental benefit-cost analysis for project evaluation.
- Effective decision-making in a project environment.
- Output of the evaluation phase.

Unit 13: The Planning and Reporting Phases -Getting Results through Effective Communication:

- Develop and assess VE proposals to optimize project value.
- Develop action plans and assign project roles and responsibilities.
- Report VE of findings to senior management and project stakeholders.
- Mastering oral presentation techniques and interpersonal skills.
- Strategies for project plan execution.
- Incorporating VE into the early project phases.
- Integrating VE with continuous improvement techniques.