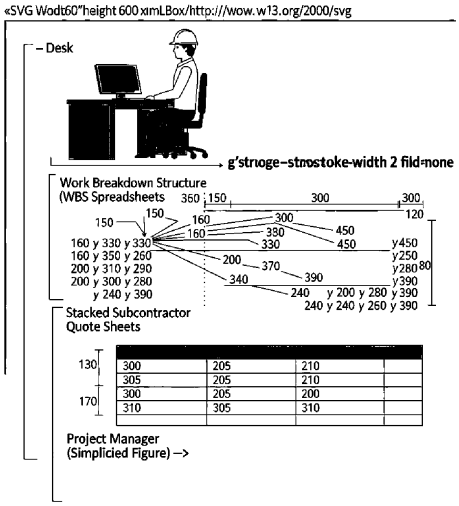
HIGH-VOLUME

WORKSHEET 2 OF 9

Three-Point Estimate Sheet -- Per Component

One row per cost component. Use for any component whose value exceeds 10% of total estimated cost, or any component with no recent historical data.



Complementary worksheet for
Project Cost Estimation
by Ibrahim Anwar

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SECTION 1

What This Is For

A single-number estimate for a high-uncertainty component is not a precise forecast. It is unquantified confidence -- the estimator's best guess dressed up as a figure. Three-point estimating replaces that single number with a calculation: optimistic, most likely, and pessimistic scenarios, weighted by the PERT formula E = (O + 4M + P) / 6. The result is an expected value that reflects the actual distribution of likely outcomes, not just the plan that assumes everything goes well.

Use this sheet for any component whose value exceeds 10% of total estimated cost, and for any component you have not priced in the last twelve months. High standard deviation -- a wide gap between O and P -- is a signal to investigate before signing the contract, not a signal to add a larger contingency buffer and move on. This sheet also generates the three highest-risk components by SD, which become the focus of pre-signing investigation and the basis of the contingency category decision.

SECTION 2

Benefits

What you get when you actually run this worksheet on a real situation:

- Produces an expected value per component that accounts for the range of realistic outcomes, not just the hoped-for scenario.
- Identifies the three components driving the most estimation uncertainty before the contract is signed, when investigation is still possible.
- Generates a total project SD figure that shows whether the overall estimate range is too wide for a fixed-price contract.
- Provides a documented basis for contingency sizing that can be shown to a client, reviewer, or auditor -- not a percentage chosen by feel.
- Creates a record of the O and P sources that the post-project review uses to test whether the ranges were calibrated correctly.

SECTION 3

Framework To Use

PERT Three-Point Weighted Average

Four times the weight on the most likely scenario. Wide SD means investigate, not add contingency.

O -- OPTIMISTIC	M -- MOST LIKELY	P -- PESSIMISTIC
Best realistic outcome for this component. Not industry best ever -- best that could actually occur on this project with this team.	Cost if conditions run normally. Consistent with typical experience on similar work. Gets 4x weight in the formula.	Worst condition that has genuinely occurred on similar work in the past three years. Not catastrophic -- experienced bad.

SECTION 4

How To Use

Follow these steps in order. Each one builds on the previous.

1. List every cost component that exceeds 10% of total estimated cost as a separate row. Also add any component you have not priced in the last twelve months, regardless of size.

2. For each row, fill in O, M, and P from historical records: actual price ranges from recent purchases, actual duration ranges from similar projects, actual bid ranges from previous subcontractor tenders. If no historical data exists, widen the range -- uncertainty does not shrink because acknowledging it is uncomfortable.

3. Calculate E = (O + 4M + P) / 6 for each row. This is the expected cost for that component.

4. Calculate SD = (P - O) / 6 for each row. A component with SD greater than 15% of M warrants investigation before contract signing.

5. Sum the E column to get total expected project cost. Calculate total project SD as the square root of the sum of all individual SD squared values.

6. Identify the three components with the highest SD values. These are the dominant risk sources. Investigate them -- get a firm quote, visit the site, lock in a material price -- rather than absorbing their uncertainty into contingency.

7. Use the range E plus or minus 2 SD to assess whether the estimate is suitable for a fixed-price contract. If 2 SD represents more than 15% of E, the scope is not yet defined tightly enough to bid at a fixed price without protective contract language.

SECTION 5

Example Use

An electrical contractor is estimating panel installation for an industrial facility. Imported switchgear is the dominant cost component with dollar-rate exposure. She applies three-point estimating to the four highest-value components.

Component 1 -- Imported switchgear panels: O $28,000 (stable exchange rate, direct factory price), M $32,500 (current market via distributor), P $41,000 (dollar spikes 15% plus import delay requiring air freight). E = (28,000 + 4 x 32,500 + 41,000) / 6 = $33,167. SD = (41,000 - 28,000) / 6 = $2,167.

Component 2 -- Cable and conduit (local supply): O $9,800, M $11,200, P $13,500. E = $11,283. SD = $617.

Component 3 -- Field labour (14 weeks, 6 workers): O $18,000 (full productivity, no rework), M $22,000 (normal conditions), P $31,000 (two technicians replaced mid-project, rework on panel wiring). E = $22,833. SD = $2,167.

Component 4 -- Testing and commissioning: O $3,200, M $4,100, P $6,800. E = $4,300. SD = $600.

Total E = $71,583. Total SD = $3,184. The range E +/- 2 SD = $65,215 to $77,951 -- an 18% spread on a fixed-price contract.

The two components driving this spread are the imported switchgear and field labour, both with SD of $2,167. The contractor requests a firm 90-day price from the switchgear distributor and locks it in writing. She also reviews the labour productivity assumption against the last two similar projects in the historical database: the $22,000 M figure was based on a project that ran 3 weeks over schedule. She revises M to $24,500. Revised project E: $73,083. Revised total SD: $3,042. Contingency Category B (10%) because the switchgear price is now locked. Contingency: $7,308. BAC: $80,391.

SECTION 6

The Worksheet

Tear this out, copy it onto a fresh sheet, or fill it in directly.

Three-Point Estimate Sheet -- Per Component

One row per cost component. Use for any component whose value exceeds 10% of total estimated cost, or any component with no recent historical data.

COMPONENT	O -- OPTIMISTIC ($)	M -- MOST LIKELY ($)	P -- PESSIMISTIC ($)	E = (O+4M+P)/6 ($)	SD = (P-O)/6 ($)	SOURCE OF O AND P RANGE

Reflection Prompts

After filling in the worksheet on the previous page, work through these.

1. For the O and P columns: use actual price ranges from recent purchases or bids, not imagination. Record the source of each O and P figure in the last column -- if you cannot name a source, the figure is a guess, not an estimate.

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2. Rank all rows by SD value, highest first. The top three components by SD are the ones to investigate before signing -- not to add to contingency and move on. Investigation means: get a firm quote, physically verify the site condition, lock a material price in writing, or reduce scope ambiguity.

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3. Calculate E +/- 2 SD. If the 2 SD band represents more than 15% of total E: the estimate is not tight enough for a fixed-price contract without protective clauses covering at least the top-SD components. Write one sentence in the estimate file stating which components carry the most risk and what was or was not done to reduce it.

SECTION 7

Tips and Traps

TIPS

- The P value is the most important number on the sheet and the most often underestimated. The right question is not 'what is the worst that could happen?' but 'what is the worst that has actually happened on this type of work in the past three years?' Ground P in what has occurred.
- For labour components, O and P should reflect actual duration ranges from completed projects of the same type. An O that is 10% below M and a P that is 10% above it describes a component with essentially no uncertainty. That is almost never true for field labour.
- Once a material price is locked by a vendor quote valid for 90 days or more, set O = M = the quoted price and P = quoted price x 1.08 for logistics and minor specification changes. This collapses the SD for that component immediately.
- High SD on a component does not automatically mean add more contingency. It means investigate. A $5,000 SD on imported equipment resolved by locking the price is better than a $5,000 contingency buffer.

TRAPS

- Setting O too close to M and P too close to M to produce a tidy, confident-looking estimate. An SD of $200 on a $30,000 imported equipment component is almost certainly wrong. Review the exchange rate history for the past 6 months.
- Applying three-point estimating only to the line the estimator already knows is risky, while leaving the other large components at single-point estimates. The planning fallacy operates most strongly on familiar components.
- Omitting the Source column. Without a written source for O and P, the ranges cannot be reviewed by the owner, challenged by a technical reviewer, or verified by an auditor.
- Using the E total from this sheet and then adding a single contingency percentage on top without asking what the SD profile implies. The contingency category should be driven by the SD distribution on this sheet.

SECTION 8

Appendixes

Appendix A -- PERT Formula Quick Card

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Expected value:     E = (O + 4M + P) / 6
Standard deviation: SD = (P - O) / 6

E +/- 1 SD   covers ~68% of probable outcomes
E +/- 2 SD   covers ~95% of probable outcomes

Total project expected cost:
  E_total = E1 + E2 + ... + En

Total project standard deviation:
  SD_total = sqrt( SD1^2 + SD2^2 + ... + SDn^2 )
  (valid when components are independent)

Contingency category signal from SD_total:
  SD_total < 5% of E_total     -> Category A likely sufficient (5-8%)
  SD_total 5-12% of E_total    -> Category B warranted (10-15%)
  SD_total > 12% of E_total    -> Category C minimum (18-25%)
                                  investigate top-SD components first
```

Appendix B -- Common Sources for O and P Ranges

```
Materials (local supply)
  O: lowest price from the same vendor in the past 12 months
  P: highest price from any vendor in the past 12 months + 5%
     for logistics variance
  Source: vendor price list date, purchase invoice date

Materials (imported)
  O: current distributor quote at today's exchange rate
  P: current quote x (1 + exchange rate 6-month high / current rate)
     + 8% for potential import delay, air freight surcharge
  Source: quote document, central bank exchange rate data

Field labour
  O: best actual productivity achieved on the same work type
     in the past 3 years (shortest duration, best conditions)
  P: worst actual duration on the same work type in the past 3 years
  Source: post-project review sheets for same work type

Subcontractors
  O: lowest written quote received in this tender round
  P: highest written quote received, or lowest quote x 1.25
     if fewer than 2 quotes received
  Source: written quote documents on file
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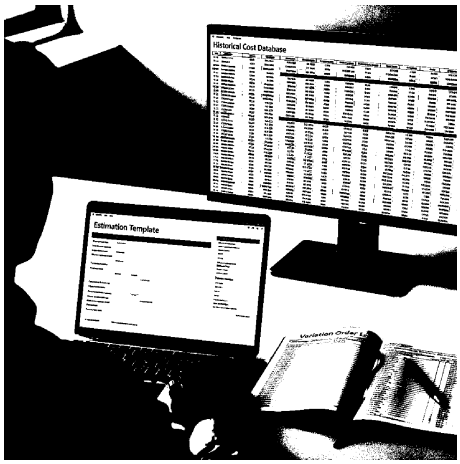

WHERE THIS WORKSHEET COMES FROM

Project Cost Estimation

Calculate the Cost Before Signing, Not After the Work Has Started

by Ibrahim Anwar

This worksheet is one of nine in the *Project Cost Estimation* companion worksheet pack. The full pack is grouped into three categories: high-volume worksheets you can run weekly, niche-search worksheets for rare but high-value situations, and specific-case worksheets that walk you through a single concrete scenario.

Every framework, decision filter, and figure used in these worksheets is drawn from the chapters of the source book. The book sets the diagnosis, the worksheets give you the form to act on it.

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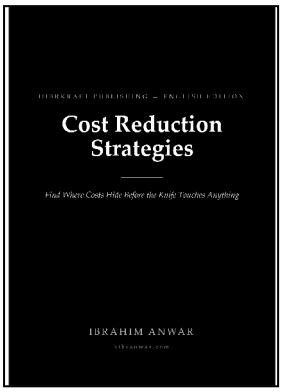

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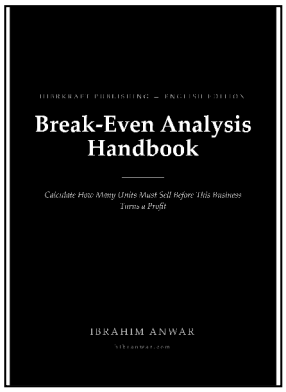

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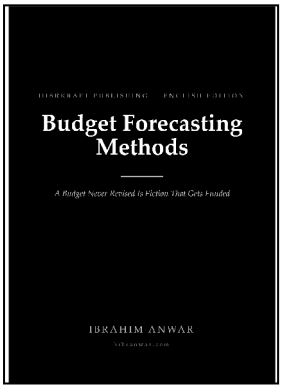

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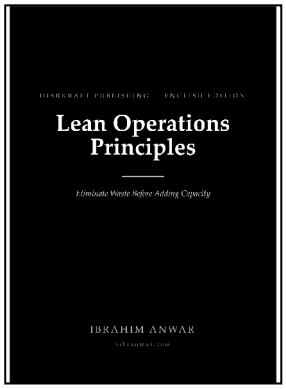

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