

Best Value Formula

David P. Quinn
National Security Agency

A constant concern when preparing to release a Request for Proposal is that one bidder will throw things completely out of whack by “lowballing.” This means the bidder will bid extremely low, willingly incurring a loss in most cases, just to get the job and position themselves for future contracts. Because the bidder offers such a low price for the contract, limitations in their technical and management proposals get overlooked. This article proposes the Best Value Formula for reducing the impact of lowballing proposals by tying the price offered more closely with the technical and management proposals of a bidder. A high-level description of the proposal evaluation process is given as context. The Best Value Formula is defined and explained. Finally, examples of bids are given to demonstrate the effectiveness of the Best Value Formula.

Our organization is in the process of preparing for a firm, fixed-price contract to perform a set of concept studies. The results of these studies will be used as input in a development and integration contract. The concept studies contract is not considered a lucrative contract. The prize is actually the development and integration contract. Everyone believes the winner of the concept studies contract will have an inside track on the more lucrative contract.

When developing the proposal evaluation criteria, we were haunted by the fact that we could only take the weight of the price factor so low (30 percent) without requiring a General Accounting Office audit of the contract bidders. The weight for the price factor looked relatively high, especially for a fixed-price contract. Our fear was that one of the bidders would bid incredibly low just to get in position for the follow-on contract, and that the technical and management factors would become worthless at that point.

This is not to say that we would not have welcomed a very low price for a very good technical and management proposal. Ideally, this is what everyone wants. We just wanted assurances that this would be the case and that a poor proposal did not win just because it was priced excessively low.

Evaluating Proposals

While some people may think that price is the only factor in determining who wins a government contract, it is not. Generally, there are four major factors when evaluating contracts: technical approach, management approach, past performance on similar contracts, and price. Each major factor is assigned a weight such that the sum of the weights equals 100. The assigned

Table 1: Example of Technical Score

Factor/Subfactor	Weight	Rating	Score
Technical	60	88.3	53
Trade Studies	20	85	17.0
Architectures	15	90	13.5
Innovation	25	90	22.5

weights allow for a greater emphasis to be placed on one major factor over another. An even-weight distribution would have weights of 30 for technical, 30 for management, 10 for past performance, and 30 for price. For our Request for Proposal (RFP), the assigned weights were 60 for technical, 10 for management, and 30 for price. Past performance was made a pass/fail factor with no weight.

Each major factor may have one or more subfactors that comprise the major factor. For instance, management may have subfactors of project management and key

“The desirable position for the government is to find a way that directly considers the price bid with the technical and management capability so that price is not the true deciding factor.”

personnel. Each subfactor is weighted and scored individually. For our RFP, the technical factor had subfactors of trade studies, architectures, and innovation with weights of 20, 15, and 25, respectively.

When evaluating proposals, a defined set of criteria for each subfactor is rated. The rating is done as a percentage of a subfactor and has a description associated with it. The usual rating scale is as follows:

- Excellent 90-100
- Good 80-89
- Acceptable 70-79
- Marginal 60-69
- Unacceptable 0-59

Unacceptable ratings are based on completely missing one of the criteria for a subfactor or major factor. Marginal means that there are faults in the proposal against certain criteria but the criteria are addressed. Acceptable means that the criteria are met. Ratings above acceptable indicate that the proposal had some additional information that helped it stand out.

The score for a factor is therefore defined as the sum of the scores of the subfactors. The score of the subfactor is the rating times the weight. Using our technical factor as an example, a sample scoring is shown in Table 1. The final score for a proposal evaluation is the sum of the scores for the major factors. In most instances, the final score formula looks like this:

$$\text{Final Score} = \text{Technical Score} + \text{Management Score} + \text{Price Score}$$

The highest final score is considered the contract winner. To select a bidder that did not receive the highest score requires lots of extra paperwork. In the case of a similar contract to ours, 500 pages of justification were generated to not pick the highest score.

Cost as a Factor

One factor that is not rated on the scale in Table 1 is price. Cost simply indicates what the vendor will charge for its services. Therefore, all price proposals are assumed to be acceptable.

There is a very generic formula used when determining price as a factor for most contract proposals. All the proposals are received and the lowest price of all the proposals becomes the standard by which all the proposals are evaluated. One at a time, each proposal is evaluated by taking the lowest proposal price and dividing it by the price of the proposal being evaluated. That fraction is then multiplied by the weight of the price factor for the price

score. The formula looks like this:

$$\text{Price Score} = \text{Price Weight} * (\text{Lowest Price} / \text{Current Proposal Price})$$

In theory, this is not bad. It works best when the proposed prices are all in the same neighborhood. For instance, everyone bids in the \$8 million to \$10 million range. However, when theory meets reality, reality tends to win.

If one bidder really sends in a low price, all the other proposals pay the consequence. If three bids are in the \$8 million to \$10 million range but a fourth bid comes in at \$4 million, the other proposals lose almost half the price factor points immediately. It requires that the \$4 million proposal be deemed unacceptable for its technical or management proposal in order to lose and not have any impact on determining the contract winner.

Table 2 is an example of a bidder trying to get a contract based on an extremely low bid. Due to the extremely low bid price of bidder 5, bidders 1 through 4 lost at least half the number of price points available. The impact really is that if bidders 1 through 4 received ratings of 100 on each factor, the best overall score they could get is 85.

Examples of Price Impact on Contract Award

It is important to see what this looks like in terms of comparative bids on a contract. Table 3 shows five bidders' proposals on a contract, with two of the bidders trying to lowball the other bidders. Past performance will be pass/fail so no weighted scores are needed for it.

As the final scores show, the order of award follows the order of price from least to most (i.e., bidder 5, bidder 4, bidder 3, bidder 1, then bidder 2). Bidder 5 was able to win the contract, despite having a barely adequate proposal, by lowballing the bid. Obviously, this does not give the government the best value for its money and perpetuates the stereotype that the lowest bid always wins. The government's only hope is that the bidder fails the past performance factor.

Finding the Real Best Value

The desirable position for the government is to find a way that directly considers the price bid with the technical and management capability so that price is not the true deciding factor. In essence, the government should receive the best value for its investment by ensuring the price is proportionate to the technical and management proposals.

This actually makes the price evaluation

more consistent with the rest of the proposal evaluation process. Technical and management proposals are evaluated independent of the other bidders' technical and management proposals. Great strides are taken to ensure that one proposal does not influence the rating of another proposal. However, the price proposal is directly evaluated against the other bidders' price proposal. The price evaluation needs to move away from strictly looking at comparisons among proposals.

To address price in relation to technical and management proposals, the weight of the price factor should be adjusted based on the scores of the technical and management proposals. If you add the technical and management scores and divide that sum by the sum of the technical and management weights, a Best Value Ratio (BVR) is created. The BVR is multiplied by the price factor weight to get the Best Value Factor (BVF) for the proposal. The BVF is then substituted for the price weight to calculate the price score. The formulas for this series of computations are as follows:

$$\text{Best Value Ratio} = (\text{Technical Score} + \text{Management Score}) / (\text{Technical Weight} + \text{Management Weight})$$

$$\text{Best Value Factor} = \text{Best Value Ratio} * \text{Price Weight}$$

Table 3: Example of Proposal Scores

Factor	Bid 1	Bid 2	Bid 3	Bid 4	Bid 5
Technical Weight	40	40	40	40	40
Technical Rating	85%	90%	90%	80%	70%
Technical Score	34	36	36	32	28
Management Weight	30	30	30	30	30
Management Rating	90%	90%	90%	80%	70%
Management Score	27	27	27	24	21
Price Weight	30	30	30	30	30
Price Bid	7	10	6	4	3
Lowest Price Bid	3	3	3	3	3
Price Score	12.9	9.0	15.0	22.5	30.0
Final Score	73.9	72.0	78.0	78.5	79.0

Table 4: Example of Best Value Formula Results

Factor	Bid 1	Bid 2	Bid 3	Bid 4	Bid 5
Technical Weight	40	40	40	40	40
Technical Rating	85%	90%	90%	80%	70%
Technical Score	34	36	36	32	28
Management Weight	30	30	30	30	30
Management Rating	90%	90%	90%	80%	70%
Management Score	27	27	27	24	21
Price Weight	30	30	30	30	30
Price Bid	7	10	6	4	3
Lowest Price Bid	3	3	3	3	3
Price Score	12.9	9.0	15.0	22.5	30.0
Old Final Score	73.9	72.0	78.0	78.5	79.0
Best Value Ratio	.8714	.9000	.9000	.8000	.7000
Best Value Factor	26.1	27.0	27.0	24.0	21.0
Best Value Score	11.2	8.1	13.5	18.0	21.0
New Final Score	72.2	71.1	76.5	74.0	70.0

Factor	Bid 1	Bid 2	Bid 3	Bid 4	Bid 5
Bid Price	9	10	9	8	4
Lowest Price	4	4	4	4	4
Price Weight	30	30	30	30	30
Price Score	13.3	12	13.3	15	30

Table 2: Impact of a Lowball Bid

$$\text{Best Value Score (or Price Score)} = \text{Best Value Factor} * (\text{Lowest Bid} / \text{Current Price Being Evaluated})$$

Table 4 shows the results of applying the BVF to the bids in Table 3. The BVF changed the order of bidders to better reflect the government's desires. Assuming all bidders pass the past performance criterion, bid 3 would be awarded the contract since its strong technical and management proposals had little impact on its competitive price. Bid 5's attempt to lowball the bid goes unrewarded as their weak technical and management proposals weakened the impact of their low price. The bid that provides the best value is identified and rewarded.

Whither Go Past Performance

The examples above were all based on the assumption that past performance is a pass/fail factor, and it does not have any weight associated with it. If past performance is a rated factor with an associated weight, it is up to the acquisition organiza-

Setting Up a Spreadsheet

A formula is only valuable if it is applied properly, and it can be automated through a spreadsheet. Below are helpful hints on how to set up a spreadsheet to calculate best value variables. Included are examples of spreadsheet formulas that can be used and the points in the source selection process when a certain value can be entered.

Three assumptions will be made. First, past performance is assumed to be pass/fail or a subfactor under the management factor. Second, the first row of the spreadsheet will be used as a header row to identify the various bidders. Third, the first column in the spreadsheet will be used for variable names to identify where to assign values.

	A	B	C	D	E
1	Variable Name	Values	Describes	Example	Available After
2	Technical Weight	Constant	Weight assigned to the technical proposal.	40	Source selection criteria released.
3	Technical Rating	0 to 100	Percent number representing the adjectival rating for the technical proposal.	84%	Source selection team consensus.
4	Technical Score	0 to Technical Weight	Normalized score for technical proposal computed by multiplying values in rows 2 and 3.	= B2 x B3	Technical rating is entered.
5	Management Weight	Constant	Weight assigned to the management proposal.	30	Source selection criteria released.
6	Management Rating	0 to 100	Percent number representing the adjectival rating for the management proposal.	78%	Source selection team consensus.
7	Management Score	0 to Management Weight	Normalized score for management proposal computed by multiplying values in rows 5 and 6.	= B5 x B6	Management rating is entered.
8	Price Weight	Constant	Weight assigned to the price proposal.	30	Source selection criteria released.
9	Price Bid	Constant	Price bid by vendor; could be rounded to nearest thousand if desired.	\$9,455	When proposals are received.
10	Lowest Price Bid	Lowest Price of all Bids	Lowest price of all bids received.	Minimum of row 9	After prices are entered.
11	Best Value Ratio	0 to 1	Computed by adding rows 4 and 7 then dividing by sum of rows 2 and 5.	= (B4 + B7) / (B2 + B5)	Computed when technical and management ratings are entered.
12	Best Value Factor	0 to Price Weight	Normalized score for price proposal computed by multiplying values in rows 8 and 11.	= B8 x B11	Computed when technical and management ratings are entered.
13	Best Value Score	0 to Price Weight	Price value in terms of best value.	= B12 x (B10 / B9)	Computed when technical and management ratings are entered.
14	Final Score	0 to 100	Total of technical, management, and price scores.	= B4 + B7 + B13	Computed when technical and management ratings are entered.

tion to determine if past performance scores should be part of the BVF. If it is decided that past performance will be part of the BVF, the past performance score should be added to the technical and management scores in the BVR. Additionally, the past performance weight should be added to the technical and management weights in the ratio. The BVR would then look like this:

$$\text{Best Value Ratio} = \frac{(\text{Technical Score} + \text{Management Score} + \text{Past Performance Score})}{(\text{Technical Weight} + \text{Management Weight} + \text{Past Performance Weight})}$$

Punishment or Reward?

Is a bidder being penalized twice for a weak technical or management proposal? As the example above shows, all the bid-

ders were deemed acceptable. It is hard to call applying their technical and management scores to their price proposal a punishment. However, a bidder that provides an *excellent* proposal should be rewarded. The BVF rewards bidders who have stronger proposals.

More importantly, the question is this: Is it fair to punish the government with a less-qualified bidder just because they had the lowest price? The BVF is a method for reflecting the government's true best interest. It is meant to help quantify where the government gets the best technical and management implementation for its money.

Scores Are Just an Aid

In any proposal evaluation, the awarded scores cannot be the sole basis for final judgment. Other factors such as price real-

ism and fit with government oversight practices are considerations. The BVF is an aid that provides a more appropriate order to the bidders but it is not a substitute for sound reasoning. The final award requires written justification stating what makes one bid superior to another.

Validating the BVF

A program similar to ours just completed awarding three contracts to conduct concept studies. There were four bidders and one of them tried to lowball the bid, significantly. The lowball bid had the worst technical and management proposals but they had the highest score based on their low price. It required 500 pages of documentation to support not awarding one of the three contracts to this bidder.

The scores from this program's evaluation were entered into the BVF. The lowball bid ended up having the lowest score of the four bids. The BVF placed the bid in an order that best represented best value to the government.

Conclusion

When going to contract, the government should have a tool that alleviates the concern that a bidder is going to throw the entire acquisition out of line by focusing on price vs. a sound technical and management proposal. The current method for determining the impact of price is based on a comparison between bids. Price needs to be considered in direct correlation with technical and management proposals. The BVF considers price with relation to the other factors. It does a much better job of focusing the proposal evaluation process away from price and towards a more complete picture of the proposal. ♦

About the Author

David P. Quinn was a senior computer scientist for the National Security Agency. He has 19 years of software and systems engineering experience, focusing the last eight years on process improvement. He is a Software Engineering Institute-certified Lead Assessor and served on the Capability Maturity Model® Advisory Board.

Sensible Process, LLC
30 Quail Ridge Road
Hanover, PA 17331
Phone: (717) 451-2149
E-mail: dqinn@sensibleprocess.com