- Qualitative Cost-Technical Trade-off: This method relies primarily on the judgment of the selection official and not on the evaluation ratings and scores. The final decision consists of an evaluation, comparative analysis, and trade-off process that often require subjectivity and judgment on the part of the selecting official.
- Fixed Price–Best Proposal: This method utilizes a maximum price or a fixed price for the project. Offerors must submit price proposal that is equal to or less than the specified bid price. The award is based only on the technical proposal evaluation. The offeror selected will be that whose technical score is the highest.

The qualitative cost-technical tradeoff and the weighted criteria algorithms are the most frequently used and make up nearly one-half (23 of 50) of the sample population. The adjusted score, adjusted bid, and meets technical criteria–low bid algorithms are approximately equal in number and comprise 44% of the sample. The quantitative cost-technical tradeoff and the fixed-price–best proposal algorithms are used only 4% of the sample.

The best-value parameters, evaluation criteria, evaluation rating systems and award algorithms described in this section are a generic synthesis of what the entire design and construction industry defines as best-value procurement. The differences in concepts are found due to the agencies that use them and some are due to the nature of the projects themselves. As a next step, the research team benchmarked the current practices in the highway industry against those in the general construction industry. The next section discusses the results of a survey regarding the use of best-value in the highway construction industry.

National Transportation Agency Survey Results

As outlined in the methodology, the research team developed a survey to obtain information related to the state of practice of best-value procurement in the highway construction industry. Of the 41 agency representatives responding, 27 respondents answered that the agency had some experience with best-value procurement, two (2) agency representatives responded that the agency had no experience but planned to use best-value in the near future, and 12 respondents indicated that the agency had no experience with best-value procurement. The answers to this question revealed that among the respondents, the majority (66%) of agencies had experience with some form of "best-value" procurement.

The second question asked respondents to define the particular selection strategy or strategies used among the methods defined in the questionnaire. The following summarizes the variety of selection strategies used and the frequency of their use:

- 10 of 27 use "Meets Tech. Criteria-Low Bid" (37%)
- 7 of 27 use "A+B" (20%)
- 6 of 27 use "Adjusted Bid" (22%)
- 6 of 27 use "Weighted Criteria" (22%)

- 3 of 27 use "Multi-parameter" (11%)
- 2 of 27 use "Cost/Technical Trade off" (7%)
- 1 of 27 use "Adjusted Score" (5%)

The responses indicated that the best-value selection strategy used most often (37%) was Meets Technical Criteria–Low Bid. Several respondents included A+B Bidding and Multi-Parameter Bidding as selection strategies in the "Other" category. If these strategies are assumed to be equivalent as noted in the definition, the Multi-Parameter strategy was the next most frequently used strategy (31%). This distribution indicates that the best-value selection strategies adopted by transportation sector agencies are more closely aligned with the low bid system compared to the distribution of the award methods of the larger sample of projects, including vertical projects and projects outside of the transportation sector presented in previous sections of this chapter. The larger sample population of case study project RFPs presented in Table 4 indicated that the weighted criteria and cost-technical tradeoff strategies were the most frequently used, comprising half (25 of 50) of the sample population.

The third question asked respondents to identify what key criteria were used by the agency in the qualification or selection process. The key criteria and frequency of their use are summarized as follows:

- 16 of 25 use "Past Performance" (64%)
- 15 of 25 use "Projected Time" (60%)
- 13 of 25 use "Personnel Qualifications" (52%)
- 11 of 25 use "Management Capabilities" (44%)
- 6 of 25 use "Public Interface Plan" (24%)
- 6 of 25 use "Technical Capability/Solutions" (24%)
- 9 of 25 use other categories (36%)

The survey results for the transportation agencies indicate that past performance and projected time are the most frequently used criteria followed by qualifications of personnel. In comparison, the larger sample population cited past performance and qualifications of key personnel as the most frequently used criteria. In the case of transportation agencies, it appears that projected time performance is more important than other commonly used criteria.

Summary and Conclusions

This paper has defined the state of the industry for best-value procurement methods. Current trends in legislation are paving the way for wide-spread use of best-value procurement for highway construction projects. Four key best-value concepts of parameters, evaluation criteria, evaluation rating systems and award algorithms have been defined in this research and presented in this chapter. The application of these concepts was validated through 50 summary level and 14 detailed best-value case studies from all sectors of public construction. Lastly, best-value use in the highway industry was benchmarked though a nation-wide survey of state transportation agencies. This details the state of the industry and has provided the framework for a critical analysis of best-value methods for potential use in highway construction projects.

Several conclusions can be drawn from the results of the above analyses. First, the best-value parameter-based framework developed to describe the fundamental elements of this type of contracting works well to distill the essence of a given project and describe the salient contractual mechanisms that are inherent to its make-up. This can be extended from the analysis of case studies to the development of new best-value project procurement documents. Public owners should first identify those parameters that are of specific interest in a given project. Next, for each of the parameters, best-value evaluation criteria should be generated to permit the evaluation of competing proposals. To do this, a best-value rating system and best-value award algorithm must be selected from among the options for each identified in this paper. All of the above can then be published in the best-value RFP making the method by which the best-value proposal is determined completely transparent to the competitors. By following this approach, public owners will ensure that the entire best-value process is covered and that justification for each component in the ultimate selection decision can be justified before the RFP is published.

Next, it can be concluded that best-value contracting is already is being used successfully in the industry. The number of best-value procurement documents that were found combined with the excellent response rate to the survey both indicate that public owners not only understand the potential advantages of using this method but are able to convert these theories into practice in their construction programs.

Finally, the intersection of the literature, the case study project contents, and the survey results seem to indicate that the most important factor to public owners is the qualifications and past performance of the construction contractor. This is followed by contract price and schedule. Thus, it can be concluded that the major impetus behind implementing best-value contracting is to ensure that a competent contractor with a track record of success wins the project rather than merely the one who may have made the biggest mistake of its cost estimate. Owners apparently are willing to pay a marginal amount more for their construction to achieve this objective with regard to the "quality" of the contractor that will build their project.

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Appendix 1: Case Study Summary

Table 1.1 illustrates the additional information gleaned from the analysis of best-value RFP's collected during the first phase of this study. The case study summary below is based upon the same 50 cases previously presented in Table 2 in the best-value parameter section.

Table 1.1. Best-Value Award Algorithm Case Study Summary

State/Agency	Agency Terminology	Remarks	Best-Value Award Algorithm
Alaska DOT	Criterion Score	Divide Technical Score by Price	Adjusted Score
Arizona DOT	Quality Adjusted Price Ranking	Percentage system used to adjust bid price for technical score	Adjusted Bid
Colorado DOT Pre-1999	Low Bid, Time Adjusted	Multi-parameter bid with qualifications	Meets Technical Criteria – Low Bid
Colorado DOT Post-1999	Best-value	May use weighted criteria to arrive at an adjusted score	Adjusted Score
Delaware DOT	Competitive Proposals	Design Alternates, Qualifications, Scheduled, and Price scored.	Weighted Criteria
District of Columbia DPW	Best-value	Adds owner contract administration costs to price	Adjusted Score
Florida DOT	Adjusted Score	May also include time adjustment	Adjusted Score
Georgia DOT	Low Bid, Prequalified	Short list by qualifications	Meets Technical Criteria – Low Bid
Idaho DOT	Weighted Selection	Cost 51%; Qualifications/ Past Experience 49%	Weighted Criteria
Indiana DOT	Low Bid, Fully Qualified	Minimum technical score to be found qualified	Meets Technical Criteria – Low Bid
Maine DOT	Overall Value Rating	Divide Price by Technical Score	Adjusted Bid
Massachusetts DOT	Best-value	Included life-cycle cost criteria	Weighted Criteria
Michigan DOT	Low Composite Score	Divide Price by Technical Score	Adjusted Bid
Minnesota DOT	Low Bid, Fully Qualified	Short list by qualifications	Meets Technical Criteria – Low Bid
Missouri DOT	Low Bid + Additional Cost	Additional costs include life-cycle cost calculation	Meets Technical Criteria – Low Bid
New Jersey DOT	Modified Low Bid	Included design costs	Meets Technical Criteria – Low Bid
North Carolina DOT	Quality Adjusted Price Ranking	Percentage system used to adjust bid price for technical score	Adjusted Bid
Ohio DOT	Low Bid	Includes design costs	Meets Technical Criteria – Low Bid
Oregon DOT	Best-Value	Combine technical with cost by weights	Weighted Criteria
South Carolina DOT	Low Composite Score	Divide Price by Technical Score	Adjusted Bid
South Dakota DOT	Best-Value	Divide Price by Technical Score	Adjusted Bid

State/Agency	Agency Terminology	Remarks	Best-Value Award Algorithm
Utah DOT	Best-Value	Combine technical with cost by weights	Weighted Criteria
Virginia DOT	Two Step Selection	Qualifications/Experience in Step 1 and Price and Technical in Step 2	Weighted Criteria
Washington DOT	High Best-Value Score	Divide Technical Score by Price	Adjusted Score
Alberta, Canada, Ministry of Highways	Value Index	Divide Technical Score by Price	Adjusted Score
City of Reno, Nevada	Best-Value	Qualifications & Past Performance equal to Price	Weighted Criteria
City of Santa Monica, California	RFP Process	Requires Guaranteed Maximum Price and life-cycle criteria	Qualitative Cost-Technical Trade-off
City of Wheat Ridge, Colorado	RFP Process	Uses Weighted Criteria approach to arrive at technical score	Fixed Price/Best Design
District of Columbia Schools	Best-Value	Responsiveness check for qualifications, experience & subcontracting plan. Award to lowest, fully responsive bid.	Meets Technical Criteria – Low Bid
Federal Bureau of Prisons	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off
Federal Highway Administration	Best-Value	Adds owner contract administration costs to price. Uses Adjusted Score formula to differentiate between bids	Quantitative Cost-Technical Trade-off
Fort Lauderdale County, Florida	Selection/Negotiation	Requires Guaranteed Maximum Price	Weighted Criteria
General Services Administration	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off
Los Alamos National Laboratory	Best-Value	Two phase selection	Weighted Criteria
Maricopa County, Arizona	Quality Adjusted Price Ranking	Uses Weighted Criteria approach to arrive at technical score. Then computes a "$-value" of technical proposal and subtracts from price	Adjusted Bid
Naval Facilities Engineering Command	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off
Nashville County, Tennessee	Competitive Sealed Proposals	Qualifications, Management Plan and Price plus Warranty	Adjusted Score
National Aeronautics and Space Administration	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off

State/Agency	Agency Terminology	Remarks	Best-Value Award Algorithm
National Institute of Standards and Technology	Best-Value	Uses Weighted Criteria approach to arrive at technical score.	Qualitative Cost-Technical Trade-off
National Park Service	Best-Value	Uses "technically acceptable" approach to arrive at technical score.	Qualitative Cost-Technical Trade-off
Pentagon Renovation Program Office	Best-Value	Uses Weighted Criteria approach to arrive at technical score; includes incentive clauses.	Qualitative Cost-Technical Trade-off
Seattle Water Department	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Quantitative Cost-Technical Trade-off
University of Colorado	Best-Value	Qualifications/Experience in Step 1 and Price and Technical in Step 2	Weighted Criteria
University of Nebraska	Best-Value	Qualifications/Experience in Step 1 and Price and Technical in Step 2	Weighted Criteria
US Army Corps of Engineers	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off
US Customs Service	Best-Value	Uses Weighted Criteria approach to arrive at technical score. Requires Guaranteed Maximum Price	Qualitative Cost-Technical Trade-off
US Department of Energy	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Quantitative Cost-Technical Trade-off
US Forest Service	Best-Value	Uses Adjusted Bid formula to differentiate between bids	Quantitative Cost-Technical Trade-off
US Postal Service	Best-Value	Uses Weighted Criteria approach to arrive at technical score	Qualitative Cost-Technical Trade-off
Utah Dept. of Natural Resources	Value Based Selection	Combine technical with cost by weights	Weighted Criteria

Preference for A + B Contracting Technique among State Departments of Transportation

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Abstract

The objectives of the research are to compare performance, cost and value implications of design-build contracts, A+B contracts, lane rental contracts and traditional contracts. Specific performance and cost measures considered are Administration Costs, Project Costs, Management Complexity, Disruption to Third Parties, Road User Costs, Innovation, Product/Process Quality, and Funding Flexibility & Duration. Performance parameters are compared on nine different project types. The research compares the three innovative contracting techniques to traditional contracting on relevant performance factors for each project types, resulting in a "best practices guide" along with project selection criteria for innovative contracting methods. The research methodology utilized a survey of national experts who rated each innovative contracting method for each performance factor on each of the project types. Results of the findings from the survey of national experts as well as summaries of case study interviews are described and discussed.

Keywords- A + B Contracts; innovative contracting; performance

Problem Statement

Many governmental agencies charged with delivering public infrastructure are experimenting with innovative contracting methods and have been over the past ten years. Many of the more common techniques have recently been formally approved for use by the Federal Highway Administration (FHWA 2002). One particular federal program, Special Experiment Project Number 14 (SEP-14), is helping to accurately define and clarify many of these new innovative contracting methods to ensure that the processes and practices involved with innovative contracting are implemented effectively. The mandates of SEP-14 apply only to federally funded projects, but states can use the techniques presented in the SEP-14 legislation on state funded projects. The primary objective of SEP-14 is to review specific innovative contract techniques as they are applied to specific projects, which are monitored closely by participating state Departments of Transportation (DOT) to measure the

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effectiveness of innovative contracting compared to the traditional design-bid-build method or other acceptable methods. However, many states are lagging in report preparation, and those states that have completed reports have not presented their information in a consistent manner.

The specific innovative contracting methods under investigation in the SEP-14 report are:

- A + B with an Incentive/Disincentive option (A + B w/ I/D),
- Lane Rental,
- Warranty Clauses, and
- Design-Build.

A + B contracting is sometimes referred to as cost plus time contracting, or biparameter bidding. In A + B contracting, the submitted bids include a cost and a schedule for completing the work, typically within some boundary conditions established by the DOT. The DOT can then translate time differences into an economic value by using the average daily Road User Costs in order to optimize the economic value (costs/benefits) of the bids. The DOT may also include incentive and/or disincentive (I/D) language in the contract as motivation to complete the project in a timely manner. Incentive clauses indicate the bonus to be paid if the contractor finishes earlier than the contractual completion state, whereas disincentive clauses indicate penalties to be imposed for failing to meet the contract completion date. The award is made to the bidder whose combination of cost and time reflects the best value. Road User Costs and the method for incorporating them into the award decision are discussed in more detail in subsequent sections of the paper.

Lane rental is somewhat similar to A + B contracting in that attempts are made to include the "cost" of disruptions or loss of service to the traveler in the bid consideration. Bidders include a schedule for lane or shoulder closings along with a cost for construction. The DOT assigns an hourly or daily charge for closing a lane or shoulder and charges the contractor for the closure. The objective is to motivate contractors to minimize closures on high-volume roadways or during high volume times. Similarly to A + B contracts, Road User Costs form the basis of the lane rental fees.

Warranty clause projects utilize contracts that shift the burden of maintenance and repair of deficiencies to the contractor for a specified period after completion of the project. A warranty contract transfers much of the quality process responsibility to the contractor, along with the risk of quality failures. Because warranty clause contracts are very dissimilar to the other innovative contract types, they were excluded from consideration in this study.

Design-build is a contract method where a single entity is awarded a contract for both design and construction of the project. Whereas A + B and lane rental contracting fit the traditional delivery model of design-bid-build, design-build represents an alternative form of delivery where construction begins prior to the completion of design. Therefore, design-build is a departure from both traditional procurement and delivery. Although design-build can involve complex funding, procurement and delivery processes, there are many benefits to DOT's from the use