

Qualifications-Based Selection of Construction Services: Evaluation Criteria That Best Differentiate Contractor Qualifications

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Qualifications-based selection (QBS) of construction services uses a variety of criteria to evaluate submitted proposals and select a contractor for the project. The criteria typically fall into three categories: past performance and technical capability, key personnel, and price, with price often being considered the most important factor in selection. The merits of evaluating key contractor personnel as a part of QBS is not well described or discussed in the literature. Prior research has investigated the evaluation criteria elements and their ability to differentiate proposing contractors. This case study used QBS evaluation data from fifty-eight construction projects to show that use of a structured interview process provides the highest level of differentiation of qualifications of contractors, as compared to the proposed price and the technical proposal. The results of the analysis also indicate: 1) The key personnel element (the interview) is statistically more important than price, 2) Contractors who propose on projects using QBS should use their best people in proposal response, and 3) Contractors should educate/prepare their teams for interviews; people count.

Keywords: Qualifications-Based Selection, Contractor, Construction, Interviews, Selection Criteria,

Introduction

When purchasing products, goods, or services the consideration of the cost, or price, often dominates other possible selection criteria (Eriksson, 2008). In the award of construction services, the ultimate project quality and buyer's satisfaction correlates directly to the quality of the selected contractor performing the services (Kumaraswamy & Anvuur, 2008; Russell & Jaselskis, 1992). Intuitively, most owners and buyers of construction services understand that all contractors (and the key personnel that make up their individual project teams) are not created equal, and the price for a service may not be the key predictor of performance or "project success." In 1972, the Brooks Act was passed by the US Government and paved the way for qualifications-based selection (QBS) in professional services (architecture and engineering), and ultimately contracting services and other industries.

Research in the area of QBS has found that along with price, financial stability, past performance, experience, technical capability, and key personnel are important criteria in optimizing contractor selection (Del Puerto, et. al., 2008; Gransberg and Barton, 2007). These criteria for selection have been considered in various forms and weighting scenarios; in practice, they are generally classified in three categories: 1) Price, 2) Technical Capability/Past Performance, and 3) Key Personnel. The evaluation of the price and technical proposal are typically based on a variety submission documents. The Key Personnel criterion is well referenced in the literature though its merit is not widely discussed. Generally, evaluation of Key Personnel is based on individual resumes from the contractor's project team, contractor team presentations, and contractor team interviews.

The purpose of this research was to quantify the effectiveness of different QBS evaluation criteria in differentiating the expertise of proposing contractors, and also to specifically examine the effectiveness of Key Personnel interviews in determining the outcome of QBS of construction services. This study is based on case study documentation of evaluation results for fifty eight construction projects that were procured using QBS procurement processes, including individual interviews of the proposing contractors' key personnel that would be assigned to the project.

Literature Review

The selection of contractors is an important aspect in the delivery of construction projects and is linked to project success, in the terms of schedule, cost, and quality (Hatush & Skitmore, 1998). Various studies have shown that overall project quality and/or owner satisfaction is directly related to the contractor performing the work (Russell & Jaselskis, 1992; Maloney, 2002; Cheung, et. al., 2006). Hatush & Skitmore (1997) stated that, “one of the most difficult decisions taken by a client... is selecting a contractor.” The majority of construction owners over-emphasize the acceptance of the lowest price (Walraven & de Vries, 2009). Hiring contractors based on price, rather than people and expertise, can be problematic. Segerstedt, et. al., (2010) noted that “Price comes first” and that subcontractor selection by general contractors are primarily price based. Holt, et. al. (1995) found that procurement methods which concentrate on price is one of the major causes of project delivery problems.

Wong et. al., (2000) studied various contractor selection criteria to determine the importance of the “lowest price wins” philosophy. Their study indicated that construction clients are moving toward broader evaluations that include more categories and that low price is not the driving category. With the Brooks Act in 1972, Qualifications-Based Selection (QBS) for architectural and engineering professionals emerged and by 2001 had spread to over 41 states (Christodoulou, et. al., 2004). In construction, QBS is often used in alternative delivery procurement processes, including construction manager at risk (CMAR) and design build, both which utilizes a variety of selection criteria (Gransberg & Shane, 2014; Xia, et. al., 2013). Within QBS, many studies highlight the importance of non-price criteria in optimizing contractor selection. Russell, et. al, (1992) considered financial stability, past performance, experience, and key personnel availability as important criteria in selection. Hatush & Skitmore (1997) suggested financial soundness, technical ability, management capability, and health and safety reputation as key criteria. Watt, et. al. (2010) found that past project performance, technical expertise and cost are the most important criteria in the choice of contractor. No matter the specific system used or studied, generally the literature indicates that past performance, technical capability, key personnel, and price should factor into the selection process.

Although the contractor’s key personnel is discussed as an important selection criteria, little research has defined the most effective method to measure key personnel and the significance of this criteria on contractor selection. Kadefors et. al. (2007) found that most clients used interviews due to their “high perceived importance.” They found interviews provided clarification, an opportunity for poor proposal writers to present orally, and demonstrated whether the people meant to work on the project participated in the bid/proposal. Furthermore, “clients seemed unsure about how to conduct and evaluate interviews and presentations in a context of public procurement.” Ahmed et. al. (2012) evaluated an “oral interview,” indicated that the scoring value was small, 5 percent of the total score, and provided little detail of the process or its value in selection. Published research on the use of individual interviewing and its ability to assist in contractor differentiation in QBS is very limited.

Kadefors et. al. (2007) identified that for larger more complex projects, procurement was more about attracting the best proponents and “the individual, (and not the organization) seem to become more important...” when service, collaboration, and innovation dimensions of the project are combined. West (2012) stated that, “Interviews allow the owner to judge the chemistry and dynamics of a group of people before selecting a project team” and provides a way for the evaluation team to better understand and clarify the proposal.

Research Methodology

The objective of this study was to assess the ability of different proposal elements within qualifications-based selection to create differentiation among competing construction firms. The purpose of QBS is to select firms based not only upon price, but also on their past performance, quality, and expertise. Therefore, it is critical to understand the effectiveness with which different quality-focused proposal elements are able to identify varying levels of contractor expertise during the evaluation and selection process.

With a high differentiation potential in the interview element, the study focused on the use and effectiveness of an interview process during QBS. Review of the construction literature revealed a lack of analysis of the merit of interview processes, although their usage is fairly commonplace within QBS methods.

The predominant selection methodology for construction is based on price, also known as low bid (Walraven & de Vries, 2009). A comparison of price and interview was made as part of this study and will help define the importance of interviews to the more traditional selection element, price.

Qualifications-Based Selection Overview

A qualification based selection process was used to procure fifty eight construction projects. The selection process included proponent (contractor) submission of a technical proposal, a proposed price, and interviews. Evaluation of the submittals was made by the owner organizations based upon an evaluation scoring system published within the owner's tender documents. Selection of the best qualified contractor was made based on the combined weighted scores of three evaluation criteria: technical proposal, price, and interview.

For each project, an evaluation committee of three to seven members was established to review contractor proposal submissions. The evaluation committees were comprised of individuals with various roles from within the owner organization and outside consultants. They included members from procurement, internal client group(s), leadership, owner project managers, and project design teams. All evaluation committees were trained on the QBS approach and process used by their organizations, including specific training on the evaluation and scoring requirements, criteria intent, proposal templates that would be evaluated, and expected content of the specific contractor proposal documents to be reviewed. This training was conducted as a normal part of each organization's QBS process to ensure consistency of evaluation results across the projects. Technical proposal evaluations were conducted independently by each committee member, without group consensus scoring, and price proposals were sealed from these evaluators. Thus, price could have no impact on the evaluation committee's assessment of the two qualified portions; technical proposal and interview. Overall evaluation scores were based on averages of the individual evaluators' scores which were in numerical scale from 1 to 10, where 10 was the high score and 1 was the low score.

The individual requirements within each technical proposal varied based on individual project parameters and the needs of the owner. The requirements typically included company technical, financial, and project capability, project risk assessments, value add proposals (contractor-proposed bid alternates), proposed schedule, and past performance documentation on key personnel and the company. Each criteria element was scored and a combined weighted score was compiled for each contractor by the owner organization's lead procurement officer. Proponent prices were scored and weighted only by the procurement lead. A combined technical proposal and price score was used to determine short listing prior to holding contractor interviews. Short-listing criteria included number of proponents, pricing over budget (or outside of one standard deviation from the mean), and review of contractors with significantly lower overall scores as compared to their competition.

Interviews were held with all short-listed contractors. The interviews were conducted individually with key personnel identified in the technical proposal submittal. Typical interviewees included project managers and site superintendents from each short-listed contractor. Each interview was limited to less than thirty minutes, was attended by the full owner evaluation committee, and was limited to questions and answers (no sales / marketing presentations). Interviews followed a standard script of questions that was developed in advance by the owner's procurement personnel (with input from the evaluation committee). For each project, every contractor was asked the same set of standard interview questions, which facilitated a fair evaluation process.

Data Sample

For this research, actual evaluation matrices from 13 owner organizations on fifty eight construction projects were evaluated. Twelve of the participating organizations were public buyers of construction services, located across North America, consisting of state and municipal governments, public school systems, institutions of higher education, and a public energy utility company. One private organization, a large airline company, also participated. The projects included general construction, mechanical/plumbing, electrical, and roofing. The average number of contractor proposals for the sample group was 4 with a range of 3 to 5 proposing contractors between project types. The average project budget was \$2.8M with the budgets ranging from \$0.2M to \$28.5M. Table 1 summarizes the distribution, number of proposing contractors, and budgets by project type.

Table 1

Average Project Budget and Price Distribution

Project Type	Quantity	Percent	Avg. No. of Proponents (Contractors)	Average Budget
All Projects	58	100%	4	\$ 2,828,306
General Construction	31	54%	4	\$ 4,252,348
Mechanical/Plumbing	17	29%	3	\$ 1,499,544
Electrical	8	14%	3	\$ 528,338
Roofing	2	3%	5	\$ 1,250,000

Weighting of the selection criteria varied by project and project type. The average weighting was 45% for the technical proposal, 26% for price, and 29% for the Interview. The standard deviation of these evaluation criteria weights, as expressed in percentage of the total evaluation points available, was 5% for technical proposal, 6% for price, and 4% for interviews. Of the fifty-eight projects, 21 (36%) had a short list determination that reduced the number contractors advancing to the interview phase. A total of 169 interviews were conducted. Only 7% of the time the lowest price contractor was not interviewed.

Of the interviewed contractors, the selected vendor had the highest proposed price 16% of the time and the lowest proposed price 59% of the time. On the average, the selected vendor was 3% below the mean price and was within 6% of the low price. The highest ranked contractor prior to interviews was also the highest rank following the interview 74% of the time and was in the top two ranked contractors 88% of the time.

Results and Discussion

Comparing Evaluation Results for Price, Technical Proposals, and Interviews

The first area of analysis compared the effectiveness of each evaluation criteria (price, technical proposal, and interview) to identify differences in quality between competing contractor proposals. This analysis was conducted by analyzing the variability within the evaluation results of each criteria, where higher variability corresponded with greater differentiation in contractor proposals (more variable evaluation scores). The coefficient of variation was calculated for each of the three evaluation criteria on a per project basis as the ratio of the standard deviation to the mean. The coefficient of variation, sometimes referred to as the relative standard deviation, is a standardized measure of variable distribution that is expressed as a percentage, which enables comparison of the relative variability within variables that are expressed in different units. Within this study, the evaluation scoring for the technical proposals and interviews was conducted on a 1-10 scale while price was evaluated strictly based on the numerical dollar value of each contractor's bid. The overall coefficient of variation for each evaluation criteria across all 58 projects in the data sample is given in Table 2 along with a breakdown by construction project type.

Table 2

Coefficient of Variation for QBS Evaluation Scores

Project Type	Price	Technical Proposal	Interview
All Projects	7%	13%	20%
General Construction	7%	12%	18%
Mechanical/Plumbing	9%	16%	20%
Electrical	8%	9%	29%
Roofing	8%	9%	29%

Results revealed the coefficient of variation in price evaluations to be 7%, compared with 13% for technical proposals and 20% for interviews. These results show that the greatest differentiation in contractor proposals was in interview scoring, which achieved nearly twice the relative differentiation of technical proposal evaluations and nearly triple the relative differentiation seen in price submissions. Due to this large relative variation in evaluation scores, further analysis was conducted to assess the impact of interview performance on overall procurement outcomes for construction projects. In the following sections, the evaluation results recorded by the selected contractor for each project within the data set was analyzed to more clearly understand the importance of interview scores on winning the project.

Interview & Price Results for Selected Contractors

The range of element score deviation, Table 2, provided information that led to the question; was there a relationship between price and interview scores among selected contractors? For this analysis, four categories for the selected contractors was used and included Low Price/High Interview Score (PI), High Interview Score/Not Low Price (INP), Low Price/Not High Interview Score (PNI), and Not High Interview Score/Not Low Price (NIP). In twenty eight of the fifty eight projects, the selected contractor submitted the lowest price and had the highest interview score. In nineteen of the fifty-eight projects, the selected contractor had the highest interview score and not the low price. In six of the fifty-eight projects, the selected contractor had the lowest price and not the highest interview score with the remaining 5 selected contractors having neither the lowest price nor the highest interview score. Table 3 summarizes the price/interview categorized selected contractor distribution.

Table 3

Selected Contractor Distribution by Price/Interview Category

Price/Interview Categories	Total	Percent of Selected Contractors	Contract Value			
			<\$1M	\$1M-\$5M	\$5M-\$10M	>\$20M
PI (Low Price/High Interview)	28	48%	16	10	1	1
INP (High Interview/Not Low Price)	19	33%	6	10	0	2
PNI (Low Price/Not High Interview)	6	10%	3	3	0	0
NIP (Not High Interview/Not Low Price)	5	9%	3	2	0	0

In analysis of the INP grouped projects, it was determined that the selected contractor had the second lowest price 53% of the time (10 projects). Within the PNI projects the selected contractor had the second highest interview score 83% of the time (5 projects). Contract value did not appear to influence the results. In 43 projects (74%) the highest rated contractor in either price or interview was also the best or second highest rated in the other. Overall, in 47 of the 58 projects (81%) the selected vendor had the highest interview score and in 34 of projects (59%) they had the lowest price.

Interview and Technical Proposal Results for Selected Contractors

Further comparison on the scoring elements was made using the technical proposal and interview scores. They included High Technical Proposal Score/High Interview Score (TI), High Interview Score/Not High Technical Proposal Score (INT), High Technical Proposal Score /Not High Interview Score (TNI), and Not High Technical Proposal Score/Not High Interview Score (NIT). In 27 of the 58 projects, the selected contractor had the highest technical proposal score and had the highest interview score. In 20 of the 58 projects, the selected contractor had the highest interview score and not the highest technical proposal score. In 7 of the 58 projects, the selected contractor had the highest technical proposal score and not the highest interview score with the remaining 4 selected contractors having neither the highest technical proposal score nor the highest interview score. Table 4 summarizes the technical proposal/interview categorized selected contractor distribution.

Table 4

Selected Contractor Distribution by Technical Proposal/Interview Category

<i>Technical Proposal/Interview Categories</i>	Total	% of Selected Contractors	Contract Value			
			<\$1M	\$1M-\$5M	\$5M-\$10M	>\$20M
IT (High Tech Prop & High Int.)	27	47%	14	11	0	1
INT (High Int & Not High Tech Prop)	20	34%	8	9	1	2
TNI (High Tech Prop & Not High Int)	7	12%	5	2	0	0
NIT (Not High Interview or Tech Prop)	4	7%	1	3	0	0

In analysis of the INT grouped projects, it was determined that the selected contractor had the second lowest price 75% of the time (15 projects). Within the TNI projects the selected contractor had the second highest interview score 86% of the time (6 projects). Contract value did not appear to influence the results. In 48 projects (87%) the best contractor in either technical proposal or interview was also the best or second best in the other.

Distribution of Total Evaluation Scores

The analysis indicated that in a large percentage of the projects in this sample, the top two contractors were either the best or second best in the scoring elements. To provide further analysis of the highest ranking contractors the range of the scores between the top two contractors on each project was determined and categorized by the percent deviation between to top two. In 16 of the 58 projects (28%) the total scores between the top two were found to be within 2% and in 35 of the 58 projects (60%) they were found to be within 5%. This is significant as it shows that in this QBS system the best contractors rise to the top and the deviation in total score is small. When considering these findings and the deviation of scores within individual elements, the results suggest that price was less important than the interview element.

Conclusions

In this case study fifty-eight construction projects were used to better understand the ability of proposal elements to differentiate proposing contractors in a qualifications-based selection process. The projects ranged in type from general construction to specialty trade projects in mechanical/plumbing, electrical, and roofing trades. Of the three QBS proposal elements, technical proposal, price, and interview, the study found that the differentiation of the proposers was low for price, at 7%, moderate for technical proposals, at 13%, and the greatest for the interview scores, at 20%. The greater the range of differentiation, the greater the value the proposal element is for owners in selecting and justifying the selection of the best qualified contractor. For contractors proposing on QBS procured projects, the data indicated that the interview process provides them the best element in which they can differentiate themselves from their competition.

In review of the literature on QBS, it was found that presentations/interviews are commonly used and are recommended elements for selection, but little is detailed about their structure and overall value for being selected in a QBS process. This study found that 22% of the time the highest ranked contractor prior to short listing for interviews was not the highest ranked contractor in the end, suggesting that within the highest ranked group prior to interview a large number do not have the best key personnel. In 81% of the projects the selected contractor had the highest interview score and 74% of the time the best contractor in either price or interview was also the best or second best in the other. This indicates that the top two qualified contractors are easily identifiable via price and interview. With the price component having a small range between the top two contractors, perhaps the cost of a few change orders, this study shows that key personnel are a greater factor to contractor selection than price. The QBS process used in this study eliminated the influence of price on scoring of the qualitative portions of the process by

concealing the price proposals from the evaluators until the technical proposals and interviews were scored. As price did not bias the evaluation and scoring of the interviews, the accuracy of data and conclusions with regards to the importance of the interview was further substantiated

In using an interview selection process that was structured as individual interviews, with no presentation, and only with key personnel that would be assigned to the project, this case study shows that interviews play a significant role in contractor selection. Contractors can take advantage of these findings by: 1) Using their best team in proposal response, 2) Providing continuous improvement training to their people, and 3) Educating and preparing their teams for interviews. All which will enhance their ability to “win” projects.

Limitations and Further Work

Although the project values varied from well under \$1M to over \$20M, the majority of the sampled projects had a value of less than \$5M. Study of construction projects with larger project values (>\$10M) would provide further findings and possible correlations. Only 36% of the projects were shortlisted prior to interviews. An increase in projects with short lists or a comparison of short-listed to non-short-listed contractor scores may provide additional correlations and information on this subject. The QBS process generally started with the selection of professional services in construction, architecture, engineering, etc. A case study with a similar approach is planned for a project set using QBS for selection of professional services.

Ultimately the buyers of construction services hope that their QBS approach is a predictor of performance. Future research is needed in correlating selection criteria weighting, types, and approaches to the ultimate performance of the selected contractor. Using this research methodology along with actual project performance data (cost performance, schedule, and customer satisfaction) would provide further knowledge for both owners and contractors in maximizing the potential success on construction projects.

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