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QUALIFICATION-BASED SELECTION OF CONSULTANTS AND CONTRACTORS: BREAKING THE LOWEST TENDER PRICE CULTURE

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Qualification-Based Selection (QBS) is designed to focus on the abilities of consultants and contractors that will undertake an infrastructure project and, more importantly, on their past performance working with and for the client on previous projects. This paper presents a review of QBS procurement in the US and in New Zealand and details the advantages and disadvantages from the client's perspective on major public infrastructure projects. The study involved a survey of 26 public agencies, seven case studies, and a content analysis of 81 QBS project procurement documents. The study then triangulated the three independent sources of information to draw conclusions. The paper finds that QBS awards have been used successfully in a variety of procurement methods, and clients expect to increase the likelihood of project success by decreasing the chance that a marginally qualified contractor would win a major project. Additionally, respondents received tangible benefits associated with selecting contractors that were well-qualified and had a record of satisfactory performance. The paper's primary contribution is to demonstrate the value for money to the client when changing focus from lowest tendering cost to contractor qualifications and past performance.

Keywords: Procurement, Contract award, Prequalification, Construction, Design consultant, Past performance.

1 INTRODUCTION

The conflict between cost and quality creates perpetual tension in the public infrastructure sector. Public agencies are charged to seek maximum value for money as well as for safeguarding the health and safety of the public they serve (Girard 2016). Unfortunately, the overly simplistic notion that the value for money equates with the lowest awarded cost of design and construction services pervades the system. It is difficult to justify not awarding a contract to the lowest tender offer in the public sector because to do so interjects an element of subjectivity, which in turn makes the procurement vulnerable to accusations of favoritism and even corruption. Hence, the public sector has embraced the traditional design-bid-build (DBB) procurement approach, which awards contracts to the lowest tender offer because it is politically expedient and minimizes the risk of a protest of award (Del Puerto *et al.* 2017). The agency's fiduciary responsibility is fulfilled by prescriptively specifying the various components of the constructed product, which

are articulated in the design documents that accompany the requests for tender. Hence, the design consultant specifies the minimum acceptable level of quality; the construction contractors' offers are to build the minimum acceptable level of quality, and the client inspects the project to make sure it received a minimum acceptable level of quality. So, by definition, the DBB procurement with the lowest tender offer award minimizes the quality of the constructed facility.

1.1 Design and Construction Quality

The industry has long recognized that a constructed project's quality is directly related to the quality of its design documents (Burati *et al.* 1992, Bubshait *et al.* 1998, Carr and Beyor 2005, Scheepbouwer *et al.* 2017). Research has shown that design quality is directly related to the size of the fee paid to the design consultant (Bubshait *et al.* 1998). Additionally, the research has determined that "there is a point above which an increase in design fee no longer produces a commensurate increase in design quality. Poor design quality leads to increased construction costs as the project's owner is responsible for the quality of the design documents upon which the construction bids were predicated. Moreover, the design documents literally define the level of required construction quality and as such, are extremely important to a project's ultimate success." (Gransberg *et al.* 2007)

Estimating compensation for design services can be abstract as it involves intangible intellectual property as opposed to the tangible physical property in a construction compensation scheme. For example, design factors of a safety function as minimum requirements and, therefore, a consultant retained on a lowest fee basis can both legally and ethically reduce its engineering effort by increasing the design factor of safety. This act creates a situation where the project's cost may rise above the amount that could have been achieved if the consultant's fee permitted the design hours to minimize the factor of safety based on more in-depth engineering analysis. Hence, one finds a balancing act by the public client when determining an appropriate design fee, on the one hand, paying the design consultant as much as practical should make it possible to economically perform the highest quality of design. On the other hand, a functional limit exists above which increasing the consultant's fee adds no increased value for money.

Depending on the size of the project, the design costs can range from 4% to 15% with the average being around 6% for most large public works projects (Carr and Beyor 2005). Thus, the impact of failing to sufficiently invest in the preconstruction design process has an outsized effect on the client's ability to achieve budget certainty after the construction contract award. Early studies determined that the major cause of construction contract modifications were due to design deficiencies, which accounted for 56% of all construction contract modifications. Furthermore, design errors and omissions discovered during construction were found to account for 79% of all contract modification costs, which in turn averaged 9.5% of the total project cost (Burati *et al.* 1992). Love *et al.* (2011) found that in Australia, "design firms have eschewed implementing quality assurance and other subsequent aspects of quality" and that the lack of formal design quality programs leads to inaccurate contract documentation. The same study found that poor design documentation was the "major source of rework," leading to construction cost increases. Hence, one can infer that awarding design contracts at prices above the lowest tender offer has the potential to result in higher quality and more accurate design documents, which in turn will reduce construction cost growth.

1.2 United States (US) Contract Law Regulating Competition

In public works, the 1972 Brooks Act (Public Law 92-582) mandated a qualifications-based selection (QBS) process for the award of consultant design contracts in which federal funding

was involved. The law was promulgated down to state and municipal levels for most public works projects. The spirit of the Brooks Act is to mandate that the public client selects the most qualified design professional without regard to price. On the other hand, most public works construction contracts are awarded to the lowest tender offer. This contradiction pervades the US public works procurement process and leads one to ask the following question: If the governmental client mandates that the best available consultant be engaged to design a given project, why would it not desire that the most qualified construction contractor build the project?

Figure 1 (Gransberg *et al.* 2007) correlates the consultant fees, expressed as a percentage of estimated construction cost at the time that the fee was established and construction cost growth from that estimate. The data included all of the client's projects during the period 1998 through 2003 that were awarded to the lowest tender offer. Figure 1 is a regression analysis of the population, and the coefficient of determination (R^2) is 0.63. Considering that the data points include a highly nonuniform set of project types (pavements, bridges, drainage structures, etc.), the correlation is quite striking. It leads one to conclude that at least for this sample, there is clearly a point where increased design fees increase the certainty that the project will be completed at or below its early estimate. A highly important finding since the early estimate in most public works projects also becomes the basis for the project's authorized budget (Hunter and Gransberg 2014). Thus, the first objective of this paper is to explore the constraints that are unintentionally imposed on the quality of public works project by the lowest tender award system as practiced in the US.

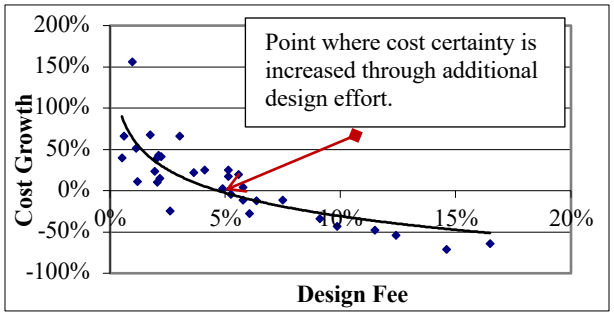

Figure 1. Cost Growth from the Initial Estimate versus Design Fee (Adapted from Gransberg *et al.* 2007).

1.3 New Zealand (NZ) Contract Law Regulating Competition

The New Zealand Transport Agency (NZTA) uses its supplier selection process to achieve the best value for money (NZTA 2019). The competition can be focused on quality, on price, or on a combination of both. Competition on price requires a detailed specification of the outputs which the suppliers are pricing. As professional services are difficult to describe precisely, the use of the lowest price conforming method is rare when selecting a professional services supplier. In this case, a focus on quality is better suited, allowing the agency to select suppliers on quality attributes, experience, skills, track record, and their understanding of the project.

The risk with a low price weighting in the selection process is that the cost of the service ends up higher to allow a high-quality supplier to be engaged. The quality-based supplier selection method offers some flexibility through a negotiation process to tailor the contract, including the price methodology, to the project. The resulting arrangement is, therefore, more likely to enable the purchaser to obtain the best value for money. When the weighting of price in the selection is high, high-quality suppliers with a higher price structure may choose not to compete, leaving suppliers who prefer to compete on price alone to enter the competition.

The paper's second objective is to contrast the findings from the two nations and provide a recommendation with regard to the employment of QBS award for both design and construction.

2 METHODOLOGY

This paper utilizes data that came from a larger study that specifically focused on US airport public works design and construction contracts (Gransberg and Touran 2019). The study included data gathered from a survey of 26 public agencies, seven case studies and a content analysis of 81 QBS project procurement documents. Survey questionnaire was developed using the principles espoused by Oppenheim (2000), and case studies were collected in accordance with the approach detailed by Yin (2008). QBS solicitation document content analysis followed the methodology proposed by Neuendorf (2002). Due to page limitations imposed on this paper, the reader is referred to the full research report to see that information (Gransberg and Touran 2019).

3 ANALYSIS OF DATA

Survey data was organized using the Importance Index theory, where survey respondents are asked to rate the frequency and value of a given factor on a Likert scale. Those ratings are then combined mathematically to calculate the Importance Index (Eqs. (1), (2), and (3)) in a manner that gives more weight to factors with high frequency and high value (Assaf and Al-Hejji 2006).

$$Frequency\ Index\ (FI)\ (\%) = \sum(n/N) * 100/T_n \quad (1)$$

Where n=Number of observations of a frequency rating for a specific factor, N=Total observations of all frequencies for a specific factor, T_n=Total observations of all frequencies for all factors.

$$Value\ Index\ (VI)\ (\%) = \sum(d/D) * 100/T_d \quad (2)$$

Where d=Number of observations of a given value rating for a specific factor, D=Total observations of all value ratings for a specific factor, T_d=Total observations of all value ratings for all factors

$$Importance\ Index\ (II)\ (\%) = (FI * VI) \quad (3)$$

Table 1 synthesizes the results of the three research instruments listed in the order of importance found in the survey analysis.

Table 1. Summary of Importance of QBS Factors.

QBS Factors	Survey	Case Studies	Content Analysis	Average
Experience of contractor's proposed project personnel	1	1	2	1.33
Past performance of contractor's proposed staff	2	3	4	3.00
Past performance of the company	7	2	1	3.33
Capacity of contractor to perform the work	3	5	5	4.33
Experience of the company	6	4	3	4.33
Availability to perform the work	4	6	6	5.33
Quality assurance plan	5	7	7	6.33
Safety plan and safety record	8	8	8	8.00
Financial strength and bonding capability	9	9	9	9.00

When the relative importance from each research instrument is averaged across each factor an important trend emerges. The top four factors all relate to the qualifications of the proposed project personnel and past performance of the company submitting the tender. Remaining five factors are all related to the specific project being tendered. This leads to the conclusion that

from a client's perspective the qualifications of designers and design consulting firm, as well as construction professionals and contracting firm, are important to ultimate success of the project.

3.1 QBS Selection of Consultants

The financial results shown in Figure 1 confirm the findings of nearly three decades of research for a single case and leads one to conclude that awarding design consultant contracts to the lowest tender offeror creates a situation where the marginal savings in the design costs are canceled by post-award construction cost growth, regardless of the basis upon which the construction contract is awarded. Table 1 shows that clients perceive that the qualifications and past performance of the firms with which they contract has greater importance to project success than the specifics of the project itself. In fact, Table 1 confirms the result of a study on design quality that found that clients use qualifications and past performance as the primary risk management tool in consultant contracts (Gransberg and Barton 2007). Hence, the pragmatic approach mandated by the US Brooks Act makes economic sense. Using QBS consultant contract awards appears to increase the quality of the tender's design documents, which in turn increases construction cost certainty. Additionally, investing more design effort was shown to actually reduce the project's final cost from early estimates by solving construction problems during the design phase when the costs are lower than after construction has commenced.

3.2 QBS Selection of Contractors

Extending the QBS process to construction contract award answers the question asked in Section 1. Table 2 summarizes the survey results regarding the construction contract award using QBS. The trend found in Table 1 is also found in Table 2. The qualifications of the construction team were perceived as a more important benefit than reduced costs. The table also demonstrates the perception that QBS contractor selection reduces risk and increases project performance certainty.

Table 2. Anticipated benefits of QBS Award of Construction Contracts (Gransberg and Touran 2019).

Anticipated Benefits	I-Index	Anticipated Benefits	I-Index	Anticipated Benefits	I-Index
Best qualified team selected	4.65	Greater project value	4.25	Greater utilization of new technology	3.90
Prequalification of subcontractors	4.65	Enhanced ability to overcome challenges	4.20	Fewer warranty issues	3.90
Early involvement of contractor	4.60	Reduced litigation	4.20	Shorter project timelines	3.80
More accurate project sequencing/scheduling	4.40	Reduced risk in complex projects	4.10	Better promotion of technical innovation	3.55
More efficient project process	4.35	Enhanced collaboration/ communication	4.00	Lower construction costs	3.40
Greater continuity	4.35	Higher quality construction	4.00	Lower design costs	3.35
Better project certainty	4.30	Reduced change orders	4.00	Lower life cycle costs	3.20
Better long-term relationships	4.30	Transparency in decision-making	3.95		

The study referenced in Table 2 found that clients "perceive significant benefits associated with the ability to select construction contractors on a basis of qualifications and past performance including enhanced cost and schedule certainty, better quality, and a reduction in disputes during project execution," (Gransberg and Touran 2019). Hence, when a contractor's performance directly influences its ability to compete for future work, it becomes more willing to cooperate and collaborate in making best-for-project decisions.

4 CONCLUSIONS

This study finds that the QBS award of both consultant and construction public works contracts is perceived by clients to promote project success for three reasons. First, the emphasis on qualifications and past performance has been found to be a powerful risk management tool. Secondly, QBS allows the client to invest in design process by removing price from the process, which in turn increases construction cost certainty. Finally, the QBS award resolves the cost-quality conflict by focusing the selection of designers and contractors on their ability to produce high quality, successful past projects rather than merely producing the cheapest possible product. In NZ, a similar process is followed for the selection of consultants, although contractor selection often still depends on the lowest cost. The US case study shows that clients should focus on contractor's qualifications and past performance rather than focusing on the lowest tendering cost.

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