

What is best value in public sector building construction?

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ABSTRACT

Although lowest bid procurement philosophy has formed the basis of procurement in public-sector building construction, for a long time it has arguably resulted in low-quality

construction work. In response, construction stakeholders have sought to explore alternative procurement philosophies. One such philosophy is 'best value'. In this study undertaken in Korea, the authors explore what is best value in public-sector building construction. Literature is used to extract best value criteria which are then ranked by a selection of managers involved in procurement of public buildings. We find that best value is categorised against six main criteria whose relative weightings vary with building type and by implication, building functionality.

Keywords: Business, Management, Procurement, Project management

1. Introduction

Procurement continues to be a popular topic for construction practitioners and scholars. There are a number of reasons for this, including the fact that procurement has a major role to play in framing expectations and assumptions concerning the powers and responsibilities of stakeholders in construction projects. Different procurement approaches also appear to influence client satisfaction in different ways (Lam *et al.*, 2008).

Traditionally, lowest bid procurement philosophy has served as the major underlying principle behind construction procurement (Walraven and de Vries, 2009; Yu and Wang, 2012). It however appears to have resulted in a substantial number of poor quality construction projects characterised by high numbers of order changes. In some cases the lowest bid procurement philosophy has also created opportunities for collusion between contractors. This has led to not only increased project costs emanating from re-work, but also to increased costs associated with litigation. All of this valuable experience has accrued, of course against the backdrop of governments having to struggle to reduce their overall cost of administration. Now that lowest bid philosophy is widely associated within hidden, unforeseen costs, many governments are exploring alternative procurement approaches and practices. One such practice is best value procurement.

Although best value procurement appears to be attracting the attention of governments (Cabinet Office, 2012), practitioners (Darlymple, 2002; CIOB, 2010) and scholars (Bovaird,

2000; Zhang, 2006; Yu and Wang, 2012), it has not been widely adopted across the public sector because of a view among major stakeholders in government that contractor selection criteria and processes associated with 'best value' still remains vague and an evolving concept (Walraven and de Vries, 2009) unlike the lowest bid philosophy which had traditionally given contract assessors an objective and definite meaning. Despite these anxieties, in 2007, the Korean government adopted best value as its underlying procurement philosophy. One major advantage of studying the Korean experience, as opposed to the earlier UK experience of best value procurement, for example, is that by 2007 the novelty associated with the concept had long worn off. Literature had become widely available, not just criticising the concept, but in particular which was now drawing attention to its wide range of evaluation criteria and how these were creating new problems.

This general problem is easily applied to building construction in particular. These can be assessed against two main categories; (i) the technical qualities, which deals primarily with its tangible and functional characteristics and (ii) the intangible dimension, of which its assessment is predominantly subjective. Generally, the more tangible (functional) dimensions of building products are more easily measureable using quantifiable dimensions which are primarily rational. On the other hand, the more intangible characteristics of buildings such as space and colour and value judgments are generally assessed with some reliance on personal preferences (Seymour *et al.*, 1997) which may be influenced by the social, aesthetic or even religious perspectives of the assessor (Allport *et al.*, 1960). Hence it is plain to see why best value judgments for construction projects can incorporate elements of subjectivity.

A further important complicating factor is that public buildings can do much more than supply infrastructure for the management and delivery of public services. They can also provide and organise the social space required for the undertaking of broader economic activity (Hillier *et al.*, 1984). Within that context they can also serve as highly visible facilitators and symbols of economic development, whose completion in carefully chosen locations can boost business confidence and willingness to invest in an area. In other words, their successful completions carry reputational significances that are likely to register within judgments of best value much earlier, from planning and bid selection stages onwards. If a new and prestigious building in an area ripe for economic regeneration is intended to play a

symbolic role of this nature, 'best value' may well be interpreted with an emphasis on quality and timeliness rather than cost. Benefits arising from such trade-offs are readily conceivable as broadly economic, social and political – and thus impossible to quantify for any practical purpose.

This study is divided into two main sections. The first section of the study focuses on defining the concept of 'value' and 'best value'. In the second section of the paper, the authors examine how the value and best value concept can be applied to public building construction. The study is contextualised in Korea. Thus, two research questions are presented.

- a) What is best value in building construction?
- b) How is best value in public building construction assessed?

2. Public construction procurement in Korea

In Korea, public building construction has traditionally been undertaken against three stages of evaluation: (i) pre-qualification evaluation, (ii) identifying the lowest competent bid and (iii) design-build evaluation. However recently, although the use of the pre-qualification evaluation system has fallen by about 33% to 29.3%, the use of lowest bid procurement increased to 40.1%. One of the reasons for this increase was the expansion of its use following a decision by government in 2006 to make its use mandatory for all projects over US\$30 million. The reality however was that while the lowest bid philosophy remained popular because it was seen to be transparent and easy to use (Walraven and de Vries, 2009), its use was associated with construction procurement problems now well documented in literature (see Alsugair, 1999; Conti *et al.*, 2012).

In Korea, as in other countries, the popularity of the lowest bid procurement philosophy has been as a result of an undercut bid mentality dominating construction sponsors (Runeson and Skitmore, 1999; Seymour *et al.*, 1997), resulting in the industry treating construction output more as a "price based commodity" (Runeson and Skitmore, 1999). Such an outlook inevitably meant that the lowest bid procurement philosophy became aligned to classical price theory which suggests that businesses will perceive commodities based on two cost components. In the case of construction, this will imply (i) a cost component associated with

project execution and (ii) a cost component associated with profit maximisation.

Scholars such as Cho (2010) suggest that, over a number of years, many construction stakeholders in Korea became aware that contractors offering the lowest unit prices for the delivery of construction products were not likely to deliver best quality in terms of performance. Other scholars such as Choi (2007) point out that long-term contractor assessment were able to identify a number of performance issues related to buildings procured using the lowest bid philosophy in Korea.

Awareness of these problems has intensified along with growing use of lowest bid philosophy. The Korean government reduced the threshold for mandatory use of lowest bid philosophy from US\$100 million projects and above as of 2001, to US\$30 million projects and above from 2006 onwards (Choi, 2007). Thus, by 2008, 70% of the entire public construction projects in Korea were being procured under the lowest bid philosophy. Hence, even within highly specialist construction projects such as in the nuclear sector, the winning bid was determined primarily by cost. Secondly, the government also expanded its pre-qualification screening agenda. Traditionally, in Korea, pre-qualification screening which had been traditionally utilised as a means of 'short listing' potential suppliers implied that, on average, for a major project, the number of companies that passed pre-qualification screening was thirty; however, from 2009, this number was routinely expanded to include a list of about seventy suppliers. Thirdly, the reality that more often than not, price served as the primary (and in some cases), sole determining factor in lowest bid philosophy led to a situation where contractors routinely submitted initial bids with excessively low bid prices simply to pass the pre-qualification screening stage. Hence for a number of years, public sector construction in Korea was characterised by poor quality outputs due to use of cheap and often poor materials and high transaction and monitoring costs.

Despite numerous revisions since 1951 when the lowest bid philosophy was adopted in Korea and 1995 since the introduction of a mandatory pre-qualification stage, complaints about the effectiveness of the lowest bid philosophy have persisted. For example, in Korea where informal relationships are highly valued (Kim *et al.*, 1999; Hitt *et al.*, 2002; Yang, 2006), opportunities of foreign firms (arguably lacking such relationships) to tender for construction work may be limited. This may have implications for the competitiveness of the market. The

procurement process was also regarded as resource-demanding, thus limiting the ability of small- and medium-sized contractors to participate in tendering. Thus, in 2006, the government commenced an industry-wide consultation process to review alternative procurement approaches. Following this consultation, in October 2007, the government revised the 'National Contract Law' and in the process announced that 'best value' represented the government's vision of the future for procurement. However, adoption of this philosophy as a guide to public-sector building projects has not been enforced since the passing of supporting legislation by the Korean parliament in 2010. Among the various reasons for this is the absence of key performance indicators and bid assessment procedures. Secondly, although there is a plethora of research on best value in construction (see for example Walraven and de Vries, 2009; Wang *et al.*, 2013; Yu and Wang, 2012), scholars remain unable to agree on a generally applicable concept of best value. The main issue here is that although perhaps not delivering on value, the notion of lowest bid could arguably be seen as objective while, on the other hand, 'value' can be perceived to be subjective and vague in meaning.

3. The value concept

According to Zeithaml (1988; p. 14), value can be perceived to represent a "consumer's overall assessment of the utility of a product based on a perception of what is received and what is given". Thus, value is subjective and experienced differently by different assessors. Value is also a contingent notion (Ramsay, 2005), and is further subject to a range of social, cultural and environmental influences. Literature therefore suggests that the value concept has been subject to a number of examinations and numerous interpretations across varying disciplines such as psychology, philosophy, and economics. However, in spite this, value is a complex notion, which has the potential to assume varied meanings (Ramsay, 2005) and can be delineated into a number of varying dimensions (Sweeney and Soutar, 2001). We however restrict our conceptualisation of value to three of its most popular dimensions; (i) economic (ii) philosophical use and (iii) psychological notions. These three dimensions are briefly explored.

Under the notion of 'economic value', value can be conceived as 'value in exchange' or 'value in use'. Generally speaking, the concept of value in economic terms refers to the ratio of costs

to benefits, thus suggesting that the predominant means of communicating the effect of all value decisions is money. Although this might be the case, from a construction procurement perspective, the economic definition of value is dependent upon whether it is examined from a supplier or client (user) perspective.

From a philosophical perspective, value can be examined from a number of philosophical dimensions including beliefs and desirable behaviours (Schwartz and Bilsky, 1990). This implies that 'value' may also be seen to reflect a cognitive state.

According to scholars such as Bardi *et al.* (2009), Calogero *et al.* (2009) and Fischer and Schwartz (2011), the psychological notion of value seeks to understand whether values have any influence on human behaviour, preferences and judgments. Within this dimension, value represents guides and priorities for the mental framing of action. Studies (von Collani and Grumm, 2009; Roccas and Sagiv, 2010; Schwartz, 2011), show that the psychological notion of value occurs at both group and individual level. At the individual level, values may be framed around either or both social and moral nodes to which the individual may make reference to in order to justify or rationalise action (or inaction). Studies (see for example, Dobewall and Rudnev, 2014) also show that at any one point in time, not only may a number of individually endorsed values apply, but that the resultant behaviour, preferences and judgments appropriate to one value may conflict with that of another value. Also, change in one value may create a temporary dissonance with others values ascribed to specific behaviour, preferences and judgments (Schwartz, 2011). Thus, two individuals may both share similar values, but differ considerably as to resultant behaviour, preferences and judgments. Group level manifestations of values occurs because although individuals are likely to assign varying importance to specific value judgements (Steinmetz *et al.*, 2009), values serve as shared and common ideals of social groups. Thus, at a group level, similarities and differences in values (mainly driven by differences in national culture, age, income, age, occupation and gender), serve to represent the desirability of particular values (Oyserman, 2002; Schwartz, 2011).

4. The best value concept

According to the National Aeronautics and Space Administration, best value does not necessarily imply 'best price'; instead it focuses on "qualitative merit" (NASA, 2001) and by implication, the long-term performance of a project. Therefore, the notion of best value fundamentally contrasts with the lowest bid philosophy. Darlymple (2002) also suggests that the definition of value must not only be specific to a particular context, but also have the flexibility to take account of varying (and sometimes conflicting) stakeholders' perspectives.

According to scholars such as Halachmi and Montgomery (2000) the notion of best value may have arisen within public sector procurement as the government's response to emerging taxpayers demands for increased accountability. Thus because best value assessments involves the articulation of predetermined measurement criteria, it serves as a means of benchmarking performance.

Assessing the notion of best value is associated with two major challenges. The first being the absence of any consensus on an appropriate algorithm to assess best value in terms of subjective factors such as fairness, integrity or equity. The second deals with whether adopting best value principles in construction procurement will remove the need for competitive tendering. Based on earlier studies by Bovaird (2000), such decisions are likely to be impacted by a number of factors including;

- a) The strategic importance of the project to national development.
- b) The ease to which success factors and best value criteria can be specified.
- c) The level of interest within the private sector.

From the synthesis of various literatures, we thus define best value in building construction as *the multi-dimensional assessment of building functionality that provides users with the best benefit measured against a specific range of social, cultural and environmental conditions*. Based on this, best value may be represented mathematically as;

$$\text{Best value} = f(\omega_1 Wa_1, \omega_2 Wa_2, \dots, \omega_n Wa_n) = f(\omega_i C_i(Wa_1), \omega_i C_i(Wa_2), \dots, \omega_i C_i(Wa_n))$$

(1)

Where:

ω : Weighting

Wa: needs

C: criteria of 'wants'

$\omega_i C_i(Wa_1)$: weighting on one of the criteria that represent Want₁

Since that 'needs' represent a minimum standard and criteria are the 'wants' that can be fulfilled above such a basic need, value is related to need. Thus, an assessment of best value involves a judgement process that utilises hierarchical structures to rank value criteria (Schwartz and Bardi, 2001). One popular approach to hierarchical structuring is Multi-Criteria Decision Analysis (Koksalan *et al.*, 2011) of which Analytic Hierarchy Process (AHP) is a popular technique.

5. The study

5.1 The research process

The study commenced with a review of the background of building construction procurement in Korea. The study also in the process articulated some challenges associated with Korean public-sector building construction projects procured under the auspices of the lowest bid philosophy, and provided a background to the decision of the Korean government to adopt the notion of best value as its preferred procurement philosophy. The notions of value and best value were explored, drawing upon extant literature to facilitate the extraction of six primary criteria of 'wants' for best value specific to building construction projects (shown in Table 1). The primary criteria were initially further sub-divided into thirty-four sub criteria.

[INSERT TABLE 1 ABOUT HERE]

Noting earlier studies - specifically that of Darlymple (2002) which emphasises that value is context-specific - in the next stage of the study, we explore the applicability of the best value criteria to the context of Korean public sector building construction. To achieve this objective, the following research process was adopted.

5.1.1 Stage 1 (Pilot study)

In order to assess the suitability of the six best value criteria, a pilot study was undertaken. This involved the questionnaire being sent to six experts drawn from public sector stakeholder groups (specifically the Korea Institute of Construction & Transportation Technology Evaluation and Planning). The objective of the pilot study was to undertake an evaluation of readability and quality of the questionnaire. More specifically the piloting of the questionnaire sought to check whether (i) potential respondents will understand the study objective (ii) clarity in the wording of the questionnaire (iii) the choice of available responses were compatible with the experiences of potential respondents and (iv) any potentially important issues been overlooked in the survey.

5.1.2 Stage 2 (The survey)

In the next stage of the study, the best value criteria questionnaire was revised based on comments received during the pilot study. Some of the revisions included (i) a slight reword of some questions in order to avoid confusion and (ii) re-design of the initial layout of the questionnaire to facilitate easier comprehension.

The revised questionnaire was structured against three main sections: while the first section (four questions in total) focused on demography, in the second section (six questions in total), the importance of each criterion was assessed, thus allowing for the calculation of individual weighting. In the third (and final) section, the importance of each of the individual value criteria was weighted using a Likert (1932) scale with '*Not important at all*' being assigned a value of '1' while '*Very important*' was assigned a value of '5'. During scoring, positive ratings of value criteria were scored as '3'; thus scores above '3' indicated that respondents were increasingly positive about the individual criterion.

5.1.3 Stage 3 (Questionnaire data gathering)

Data were obtained from a sample drawn from public-sector project stakeholders in Korea. Data was obtained in 2011. The survey was facilitated by the Korean Board of Audit and Inspection by direct electronic dissemination electronic. Respondents were drawn from a number of professional construction management networks and stakeholder groups

including the Korean Government Buildings Management Services, the Ministry of Land, Transport, and Maritime, the Korea Institute of Construction & Transportation Technology Evaluation and Planning, and individual members registered with the Korea Institute of Construction Engineering and Management. In all, a total of one hundred and eighty completed questionnaires were returned.

5.1.4 Stage 4 (Questionnaire data analysis)

The data analysis was undertaken utilising Microsoft Excel and SPSS PC Version 12. The following tests were undertaken. In order to identify criteria deemed most important by the respondents, *t*-tests were employed leading to the identification of five of the original value criteria ('*economic-feasibility*', '*safety*', '*serviceability*', '*environmentally-friendly*' and '*comfort*') as the most important ('*artistry*' was deemed as unimportant). The value criterion that attracted the highest importance rating was '*serviceability*'. In terms of the thirty-four sub-criteria value, '*accessibility*' and '*fire resistance*' were ranked as highest in terms of importance. In order to evaluate how differences in demography (e.g. age and gender) influenced how respondents rated individual value criteria, Kruskal-Wallis (1952) tests against profession and age; and a Non-parametric Mann-Whitney (1947) *U* gender test were employed. Statistical means were employed to assess significance. Sub-criteria with mean values ≥ 3.5 were designated '*Important*', thus leading to twenty-four (shown in Table 2), of the original thirty-four sub-criteria value meeting this designation.

[INSERT TABLE 2 ABOUT HERE]

5.2 Analytic Hierarchy Process (AHP)

In the next stage of the study, the Analytic Hierarchy Process (AHP) was employed in the weighting of the twenty-four sub-criteria value which had been deemed as '*Important*' following calculation of statistical means. As earlier studies, particularly that of Vaidya and Kumar (2006), provide a comprehensive review of AHP and its use as a tool for decision making, such a review has not been reported in this paper. It is also noted, according to Al

Harbi (2001), that the use of AHP has also proved popular in construction and project management research and more specifically in studies such as that of Cheung *et al.* (2001) and Wang *et al.* (2013) which focused on bid evaluation.

5.2.1 The AHP exercise

The AHP exercise which sought to rank the relative importance of individual criteria was undertaken utilising a questionnaire built against a nine scale ranking (see Saaty, 1980). Based on earlier literature on competitive bid evaluation (see Hensher *et al.*, 2000), comparators were employed to support the study. Comparators serve as points of real-life project reference. Their use is justified by earlier studies (Little, 2004) which suggest that decision making can be enhanced through the deliberate replication of reality. We drew upon earlier studies by Kim (2004), who had categorised public buildings into three use types consisting of (i) local government use for which we chose the Seongnam City Hall in the city of Seongnam, the second largest city in Gyeonggi Province, (ii) national government use for which we chose the National Assembly building in Seoul, and (iii) others for which we chose the Seoul headquarters of the National Police Agency. A pilot study (with two Ministry of Land, Transportation, and Maritime managers) was initially conducted (primarily to check framing of the questions). However, during piloting, a decision was made to re-include three of the sub-criteria which had initially been rejected at the questionnaire stage. This meant that the AHP exercise was undertaken against twenty-seven (see Figure 1), and not twenty-four sub-criteria identified earlier in Table 1. On completion of the pilot stage of the AHP exercise, the full exercise commenced with a six member expert forum. The forum comprised professionals drawn from the Presidential Commission on Architecture Policy and the Korean Board of Audit and Inspection, an organisation with responsibilities similar to those as the National Audit Office in the United Kingdom.

[INSERT FIGURE 1 ABOUT HERE]

6. Findings and conclusions

This study examined the notion of best value in Korean public building construction. Two research questions were presented to support the study. In terms of the first research question, “What is the best value in building construction?”, the authors drew upon literature to present a definition of best value in building construction as *the multi-dimensional assessment of building functionality that provides users with the best benefit measured against a specific range of social, cultural and environmental conditions*. In terms of the second research question, “How is best value in public building construction assessed?” we had employed a two-staged analysis of data to find that best value in Korean public construction was best achieved against an assessment of six main value criteria.

An abridged summary of the results from the AHP exercise is shown in Table 3. The results of the study identified eight criteria for best value in Korea’s construction projects: ‘Serviceability’, ‘Safety’, ‘Comfort’, ‘Environment friendly’, ‘Economic feasibility’ and ‘Artistry’.

[INSERT TABLE 3 ABOUT HERE]

The distributive summaries shown in Figure 2 and Figure 3 suggests that for each comparator (group of buildings), best value criteria exhibited different priority scoring. Similarly, when comparing the results of the questionnaire and the AHP surveys, we find differences in selection criteria. More specifically, the results of the questionnaire and AHP surveys show that priorities associated with the main criteria were only slightly different (Table 1). For example, the respondents of the two surveys ranked two primary value criteria, ‘serviceability’ and ‘safety’ as the most important of the six primary criteria for best value specific to building construction projects (Figure 2).

[INSERT FIGURE 2 ABOUT HERE]

On the other hand, there were also interesting observations from the sub-criteria level where priority differences from the AHP among the buildings were more diverse than those of the main criteria (Figure 3).

[INSERT FIGURE 3 ABOUT HERE]

The results suggest that best value is categorised against six main criteria and that against

comparators, value priorities differed against individual comparators. In effect, the notion of best value changed according to building type and by implication, building functionality.

As expected, the study is not without limitations. We articulate the limitations of the study within the context of further work.

In the first place, the six primary criterion utilised in the study may not be regarded as representing a comprehensive articulation of value criteria specific to building construction projects. For example, the identified criteria did not include factors such as negative publicity caused during the process of building. Studies by for example Kangwa and Olubodun (2004) suggest that such publicity is a significant value criterion in for example building (maintenance) projects. Likewise, the extent to which the contractor facilitates the management of risk was not highlighted as a possible of value criteria although studies (Zhang, 2006; De Marco and Mangano, 2013) do suggest that this is often a criterion by which contractors are assessed. Broadening this out, the extent to which the contractor co-operates with the client's team (which includes harmoniously managing and evaluating change) was not identified as a value criteria in the study. The second limitation of the study relates to response bias. Here two factors are considered; (i) that designing a questionnaire in a manner where favourable responses appear to be checked on either the right or left side of scales, may have led to bias as respondents may have simply checked off some questions against '*Not important at all*' or '*Very important*' without careful consideration of each question. However, the possibility that the respondents in this study chose extreme responses was balanced by studies exploring the impact of national culture on survey response styles (see Baumgartner and Steenkamp, 2001) and more specifically, studies (see Chun *et al.*, 1974; Lee and Green, 1991; Harzing, 2006), which suggest that Korean respondents do exhibit higher middle response styles to questionnaires than for example US/Canadian respondents who have higher extreme response styles, (ii) that demographic differences among the respondents (see Ojiako *et al.*, 2014) in how value was contextualised could have led to substantially different interpretations of the questions within the survey.

However, these concerns and limitations present opportunities for further studies to scholars who may for example seek to examine how value preferences and decision judgment differences between project stakeholders are influenced by experiential context (that is the

experience of stakeholders). Additional studies may also seek to examine how group-level psychological notion of value may be impacted by national culture and conformity demands which in the case of Confucian countries such as Korea are very strong (see Kim *et al.*, 1999; Culpepper *et al.*, 2002; Kim and Cho, 2011). In addition, referring to the earlier cited works of Schwartz (2011) and Dobewall and Rudnev (2014) future studies may also seek to examine how temporary dissonance between values may be controlled in order to determine actual 'best value'. In effect, future studies may seek to examine how multiple value judgements may be may be balanced. It is possible that such studies may be undertaken through experimental superintendence.

In conclusion, further work is also required to generalise the findings, specifically through the collation of additional value criteria, the independent grouping of such criteria and their practical evaluation against a larger number of comparators. In addition, the total sample size of one hundred and eighty respondents may be too small to be statistically representative. Thus further studies utilising a much larger sample size is recommended. The same applies to the possible internationalisation of the study because, although demographics and national culture have been shown in psychology and marketing literature to influence value perceptions and hierarchical ratings (Homer and Kahle, 1988; Shim and Eastlick, 1998), the study was undertaken within an arguably demographically and culturally homegeneous group, thus limiting the ability to discern similar impact of demographics and national culture on value perceptions within the construction industry.

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