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Focusing on best value from a source selection perspective

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ABSTRACT

The emerging focus on 'best value' in construction projects entails several crucial and complex decision-making tasks for appropriate selection of capable contractors and consultants. In such selection exercises, the 'best value' may be interpreted in many ways and thus could be correspondingly achieved at different levels. Although traditional 'price based' selection approaches are still preferred on various grounds such as simplicity and/or public accountability, they may well result in some 'false economy' or missed opportunities for procuring a better value. Furthermore, the lower significance of price as compared to the higher risk transference in project delivery methods such as Design-Build and Build-Operate-Transfer type arrangements render the purely 'price based' approaches even less useful. Therefore, a structured value focused selection approach is considered as beneficial for meeting the client's goals and project-specific needs. This paper presents discussions on some useful approaches to best value conceptualizations in 'source selection' perspectives, e.g. starting with the 'right' selection of competent constructors in Design-Bid-Build type projects. Furthermore, a conceptualized basic framework for best value selection is also presented.

Keywords: Benchmarking, best value, construction, contractor selection, procurement

INTRODUCTION

The selection of competent contractors and consultants is one of the critical tasks facing construction clients. A multitude of procurement options involving different types of contract arrangements are available to today's construction clients. 'Source selection' is an umbrella term used in this paper to represent the selection aspects of constructors, consultants, suppliers/ vendors, Design-Builders and Build-Operate-Transfer (BOT) franchisees. Normally, the traditional 'price based' selection practices ignore many significant value elements (Gransberg and Ellicott, 1996) and thereby discount differences in potential performance levels of contractors and consultants (Holt et al. 1994). The customary approach of purely price based (i.e. lowest bid) 'source' selections may not necessarily provide the most economical end results or the desired best value (Latham, 1994; Egan, 1998; CIRC, 2001; PSIB, 2003). This can be caused by many reasons, e.g. (a) several attributes other than price could influence the procured value from a construction contract and (b) contractors (or consultants) may subsequently seek some 'affecting' strategies to compensate for the unrealistically low bids (e.g. inferior materials, poor performance, unreasonable claims) (Russell and Skibniewski, 1988; Hatush and Skitmore, 1997; Kumaraswamy and Walker, 1999; Alsugair, 1999).

The definition of 'best value' in source selection perspective could vary, e.g. different clients and different project circumstances could demand different value levels in procurement (Love et al. 1998). Several decision making techniques and decision support tools are available for contractor/ consultant selections (Palaneeswaran and Kumaraswamy, 2000a). But none may offer a panacea type universal solution for all decision making scenarios (Holt, 1998). The choice of a multi-criteria decision making strategy for source selection could itself affect the best value that can be ultimately attained. There could be several common aspects of best value (from source selection perspectives) in different procurement routes. A holistic approach of analyzing the best value in source selection would be helpful in identifying the common issues together and developing a commonly applicable best value focused framework. Therefore, this paper focuses on integrating relevant findings from a series of related research by the authors including an ongoing research project on developing an integrated Management Support Systems (MSS) for construction clients and two recent doctoral research studies on source selection aspects in Design-Build projects (Palaneeswaran, 2000) and in BOT projects (Zhang, 2001). The MSS project covers procurement/ project delivery and operational systems for clients' use (that include the development of specific computerized decision support solutions for source selections in different procurement options). The research methodology in the above-mentioned three research studies included extensive knowledge mining (of explicit and tacit knowledge) from relevant archived literature and through semi-structured/ structured interviews, questionnaire surveys and project case-studies.

The objective of this paper is to introduce the concept of best value in the context of source selection and to discuss the conceptualization of a structured best value focused source selection framework. The discussions in this paper are presented in the following sections:

- First, a discussion of 'best value' conceptualization is approached and analyzed from general source selection perspectives
- Next, some 'best value' focused best practices in source selection aspects in various procurement routes are presented with a benchmarking objective
- Finally, the last section of this paper presents a conceptual framework for 'best value' focused source selection in construction projects

CONCEPTUALIZATION OF BEST VALUE FROM SOURCE SELECTIONS

Project parameters and client preferences such as time, cost, image, aesthetics/ appearance, operation and maintenance, safety, security and environmental aspects normally influence the ‘best value’ profiles/ compositions in construction projects. Specifics such as emergency situations (in general) and ‘benefits to the local economy’ (in public clients) also influence the conceptualization of ‘best value’ in construction procurement. Furthermore, patterns of risk management, flexibility requirements and resource constraints such as schedule (time) limitations, cost (budget) constraints and space limitations also impact on ultimate ‘best value’ from the source selection perspective.

‘Best value procurements’ should ideally focus on selecting the contractor whose offer is the most advantageous to the client, when price and other factors are considered (Gransberg and Ellicott, 1997). Thus, a good ‘source’ selection process should establish relevant evaluation criteria and their corresponding value functions in an appropriate ‘best value’ framework. The value (V) as defined by Prasad (1996) is:

$$V = \left(\frac{\sum(functions, features, actvities)}{\sum(\cos ts)} \right)$$

From a source selection perspective, the best value (BV) could be conceptualized as a function of several parameters including monetary gains (m), quality value (q), time value (t), relationship value (r), benefits from health and safety performance (s), environmental sustainability benefits (e), and other value factors e.g. potential benefits from issue/ change management arrangements and claims/ dispute resolution track-record (o), i.e.,

$$BV = f(m, q, t, r, s, e, o)$$

However, the value function (e.g. for an evaluation criterion in contractor selections) may not be always linear and/ or uniform, i.e. the relationships between actual face value (of a best value evaluation parameter) and the corresponding realizable best value may vary and not be uniform in some scenarios. For example, more floor area may be useful (and increase value) up to a certain limit. Beyond that limit it may not be cost effective (with increased maintenance and operational expenses) and therefore not add value. Similarly, earlier completion/ product delivery while often beneficial may not be desired in some circumstances. Examples such as operating costs (in Design-Build-Operate projects) and tolls/ tariffs (in Design-Build-Finance-Operate or Build-Operate-Transfer) projects could be leading examples for decreasing realizable best values with increasing criterion face values.

Thus, the value function of each best value evaluation parameter should describe desirable value levels of corresponding parameters. Furthermore, it should be considered that best value against some evaluation criteria may reach saturation value levels after certain limits, beyond which there may not be any worthwhile further increase in the realizable value. On the other hand, specific best value focus areas in different procurement routes are also different. Figure 1 has been developed to portray some key best value focus areas across different procurement routes. Some best value selection frameworks in the popular project delivery channels are briefly outlined in the following sections.

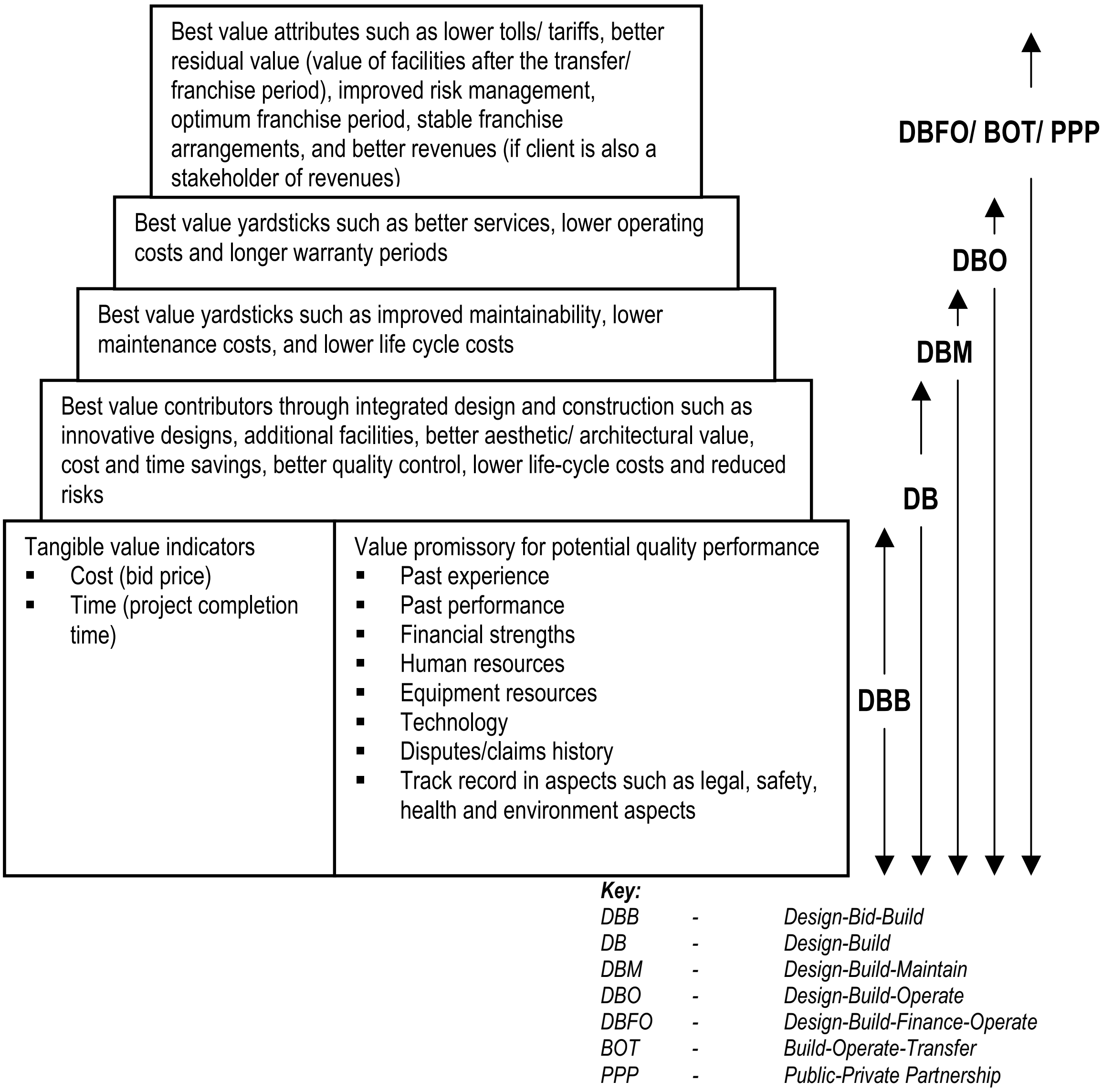

Figure 1: Best value focus areas in different procurement routes – a 'source' selection perspective.

IDENTIFYING GOOD PRACTICES FOR PURSUING BEST VALUE IN DESIGN-BID-BUILD PROCUREMENT

In Design-Bid-Build (DBB) procurements, suitable design consultants and competent constructors are selected and contracted separately. The consultants are selected through various means such as price and/or design competition and past performance considerations. In DBB, the constructors are deemed to construct the already completed designs and hence the scope for innovations is limited. Within such limited scope, the client's focus on 'best value' selection approaches normally relies on some historical data such as past performance, past experience, safety records and claims history. Various best practices such as - considering non-price attributes in constructor selections (e.g. past performance considerations), incentive/ disincentive arrangements, performance specifications and performance based contracting are now used for potentially deriving best value in DBB route. For example, on public sector building projects in Singapore, the initial (now superseded) 'CONQUAS' system conferred a tendering advantage of up to 5% for achieving consistently good quality performance (Ofori and Gu, 2001); although this is now replaced by conferring direct financial incentives on the current job itself. Some other such good practices are presented in this section with a benchmarking objective that targets best value in DBB.

Past performance consideration for potential best value delivery

Past performance could be considered as one of the indicators for future quality performance and potential best value delivery. Hence, several clients established structured systems for monitoring and documenting contractor performance. While those performance management systems are useful in controlling and improving contractor performance in ongoing projects, some clients also use the past performance information for contractor selection (e.g. in prequalification and tender evaluation). For instance, many US Departments of Transportation use such past performance data in deriving contractor prequalification ratings such as "maximum capacity rating" (e.g. as in West Virginia Department of Transportation, 1993; Commonwealth of Kentucky Transportation Cabinet, 1996; and Illinois Department of Transportation, 1997). Contractor performance scores could be integrated within the contractor selection frameworks, if there is a well-established performance measurement and documentation system. While some traditional low bid based methods consider past performance data in their ‘go/no go’ type elimination at the pre-bid stage, some advanced methods include past performance as one of the scoring parameter in their multi-criteria based tender evaluations. For example, the Hong Kong Housing Authority (HKHA) established a ‘Performance Assessment Scoring System’ (PASS) for contractor performance evaluation, on the basis of which they formulated a ‘Preferential Tender Award System’ for encouraging contractor performance and best value delivery. Furthermore, the HKHA introduced a ‘Premier League’ scheme for strategic partnership with their consistently better contractors (who maintain outstanding performance, capability to deliver good quality product and best value) (HKHA, 2001). Similarly in another recent improved selection approach, the Hong Kong Environment, Transport and Works Bureau (ETWB) introduced a couple of best value focused tender evaluation schemes that consider both the price and non-price attributes, i.e. a structured ‘marking scheme’ (ETWB, 2002a) for ‘works’ contracts where the quality of services is a major concern; and a simple ‘formula approach’ (ETWB, 2002b) for ‘works’ contracts where quality of service could be deemed as not so demanding. In both the best value focused tender evaluation schemes, the ETWB suggested to allocate a ‘60:40’ break up for price and non-price attributes. In the ‘marking scheme’ based tender evaluations, a set of technical factors are evaluated for non-price attributes with a minimum ‘pass’ level requirement for each technical factor. Similarly, in the ‘formula approach’, the contractor’s performance rating is considered (as the non-price attribute) in tender evaluations. The contractors’ performance rating database is maintained by the ETWB (ETWB, 2002c).

Extended warranties for ensuring best value

In general, warranties are used in contracts to guarantee product/ service quality over a certain period and for construction projects, 1 or 2 year warranty periods is normally used to warrant quality after project completion. However, some clients such as the Maryland Department of Transportation, USA preferred extended warranties in their contracts and adopted a bid adjustment method for such extended warranties (for each additional year beyond their stipulated minimum 5-year warranty period). Some research studies such as by Russell et al. (1999) and Chang et al. (2000) investigated such usage of extended warranties targeting best value.

Performance specifications and performance based contracting for best value

Under the philosophy of performance-based contracting, the client pays for the work it intends to accomplish for a given purpose and the client will not tell the contractor ‘how to get the job done’. It says ‘what needs to be achieved’. Performance specifying means specifying the required result rather than prescribing the means of achieving it. Key elements of performance based contracting are (i) outcome based contracts; (ii) performance specifications/ standards; (iii) compensation coupled with incentive/ disincentives; and (iv) advanced monitoring and measurement techniques. The Office of Federal Procurement Policy (1998) described the use of performance based contracting in different sectors. Such performance specifications and performance based contracting approaches could be advantageously used in best value focused contractor selection frameworks.

Value pegs with enhanced relational arrangements

The construction supply chains could be visualized in a state of ‘equilibrium’ (Palaneeswaran et al, 2003), which is being delicately managed by several internal and external forces and moments that include ‘hard’ transactional forces (e.g. binding needs to meet contractual commitments), ‘soft’ relational forces (e.g. trust, long term values of continuous relationships), client side ‘push’ (e.g. accountability, resource constraints) and ‘pull’ (e.g. industry wide reforms) forces, contractor side ‘push’ (e.g. profit margin, competition) and ‘pull’ (e.g. future opportunities, goodwill) forces, and overall project based operational moments (e.g. project management strategies and innovative approaches). Securing and enhancing the value with reinforcements in the relational bonding forces are being increasingly adopted through various measures such as partnering (Walker et al, 2000) and relationship contracting (ACA, 1999).

For example, in an advanced partnering initiative, the Hong Kong Mass Transit Railway Corporation used several innovative approaches such as (i) ‘risk registers’ for refined management of project risks (e.g. better appreciation as well as balanced allocation of risks to the appropriate party who can best manage it), and (ii) a ‘cash neutral’ based payments flow to contractors in their recent Tsim Tsa Tsui Station Extension project. In that arrangement, contractors keep an ‘open book’ transparent accounting system and shared a common project office with the clients; in turn, the clients made cost assessment based payments without any delay to keep the project cash flow to the contractor, so that the latter is ‘cash neutral’.

BEST VALUE PERSPECTIVES IN DESIGN-BUILDER SELECTION

The Design-Build procurement route is widely preferred for the single point of responsibility, innovation potentials and other benefits. The contractor selection in Design-Build involves tasks such as (a) identification of competent proposers and (b) evaluation of their price and technical proposals. Any selection process in which proposals contain both price and qualitative components, and the award is based upon a combination of price and qualitative considerations, is called a ‘Best Value’ (also known as greatest value) selection (Design-Build Institute of America, 1999). Thus, the Design-Builder selection exercise should aim for achieving suitable best value in an amicable win-win environment, balancing both quality and price in proposals. Specific structured methodologies for Design-Builder selection could be found in Potter and Sanvido (1994 and 1995), Gransberg and Senadheera (2000), Palaneeswaran and Kumaraswamy (2000b) and Molenaar and Gransberg (2001). Although, purely price-based Design-Builder selections may not ensure best value, some re-engineered ‘low bid’ based Design-

Builder selection approaches targeting best value are being used, e.g. 'Equivalent Design – Low Bid', 'Complying Design – Low Bid', 'Lowest Price – Technically Acceptable' (LPTA) and 'Low Bid Design-Build with bid price adjustment for non-price attributes such as time (e.g. as in Florida Department of Transportation, 1996). However, some Design-Builder selection approaches target best value in a better framework, e.g. 'Fixed Price – Best Design', 'Best Value Design-Build', and 'Best Quality – Best Price Design-Build'. Some good practices targeting best value in Design-Builder selection are:

- Participating in the bid preparation expenses by payment of stipends, e.g. the Public Works and General Services, Canada. The US Army Corps of Engineers devised a strategy for 'regressive stipends' that are calculated on the basis of ranking the Design-Build proposals. Furthermore, some clients such as the Florida Department of Transportation pay stipends to unsuccessful proposers and in turn, claim some 'ownership' of the innovations in unsuccessful proposals.
- Bid price adjustments for certain higher quality elements or for other client preferences, e.g. the Florida Department of Transportation, USA used a bid price adjustment scheme for early completion proposals based on their estimated 'dollar value per day'.
- Bid price adjustments for some client preferences, e.g. funding agencies such as the Asian Development Bank (ADB) recommended discounting bid prices of 'domestic' contractors by 7.5%, in order to increase their work opportunities (Asian Development Bank, 1996), and thereby help their long term development.
- 'Best and Final Offer' (BAFO) approach to obtain best value for money when choosing the best offer in which, clients could revisit their original specified outlines (for fine-tuning certain aspects) and contractors could submit their corresponding revised final offer, which will be evaluated for final selection, e.g. the Utah Department of Transportation, USA used such BAFO approach in their I-15 corridor Design-Build project.
- 'Best Design-Best Price' approach for procuring prestigious projects, e.g. the U.S. Department of Agriculture (USDA) earmarked a bottom-line bid price and called for proposals to 'bid up for quality' in their Beltsville Headquarters Office Complex project by setting a cost target price of US$ 37.7 million (Wright, 1998).
- Subcontractor registration and subcontracting limitations – While selecting the Design-Build contractors, some clients prescribe mandatory registration for their subcontractors. Furthermore some clients such as US Army Corps of Engineers, Arizona Department of Transportation and Colorado Department of Transportation in USA impose limits on the percentage of work that can be subcontracted in the Design-Build project should not exceed certain limits outlined.

In Design-Build projects the best value could be realized from various aspects of Design-Build proposals, such as project completion time, product life, maintainability, operating costs, life cycle costs, aesthetic value, environmental impact, standardization and flexibility. Ten important best value contributors were identified from a preliminary knowledge mining such as from relevant literature (e.g. Design-Build Institute of America, 1999), correspondences with various domain experts (e.g. Australia, Canada, Hong Kong, USA), brainstorming discussions, and semi-structured interviews with some Hong Kong based domain experts. The rankings for those best value contributors were derived from a consolidated summary of 66 responses to a questionnaire survey[1] on Design-Build tender evaluation aspects (Palaneeswaran and Kumaraswamy, 2003). The 'targeted' respondents were from 31 different organizations around the globe that include 41 public clients, 3 quasi government clients, 7 private clients/ consultants. Table 1 displays a consolidated summary of 'sampled' perceptions on those 'best value' contributors in Design-Build projects (Palaneeswaran, 2000).

[1] Reference web site URL: http://hello.to/design-build

Best value contributors	Rank
Improved maintainability and less operating costs	1
Earlier project completion time	2
Increased product life	3
Lower life - cycle costs	4
Additional facilities	5
Better aesthetic/ architectural value	6
Enhanced benefits for local economy	7
More environment - friendly	8
Fitness for multiple/ flexible use	9
Modular and repeatable design/ construction	10

Table 1: A summary on common best value contributors considered in Design Build projects [1]

[1] *The above rankings were derived from a consolidated summary of 66 responses to a recent survey on "Contractor Selection for Design - Build projects". The respondents were from 31 different organizations/ institutions around the globe. The survey was conducted for a Ph.D. research (Palaneeswaran, 2000).*

Design-Build-Maintain (DBM) and Design-Build-Operate (DBO) are some innovative detours from the general Design-Build procurement route in which, the clients transfer risks and responsibilities in the 'maintenance' and 'operations' of constructed facilities to the Design-Build contractors. In those procurement paths, important operational aspects such as quality of services, as well as cost of services and maintenance also contribute to the best value. For example, in the recent Tolt water treatment plant of in Seattle, USA the key procurement objectives set by the clients were as follows:

- Optimization of water treatment processes
- Minimization of design & construction costs
- Acceptable project schedule
- Integrated operations
- Quality services to the public
- Optimized maintenance & operation costs.

In the proposal evaluation of the above-mentioned Tolt water treatment plant DBO project, financial criteria (including cost effectiveness and financial qualifications) accounted for 40 percent, while technical criteria (including project implementability, technical reliability, technical viability, environmental aspects, past performance and 'women' and 'minority business enterprise' utilization) constituted the remaining 60 percent. In addition to the normal bonus/ penalty arrangements and liquidated damages for the design and construction phase, comprehensive liquidated damages were framed for the operation phase. For example, if the fluoride content in the treated water is found to be beyond the specified range of (1.0 ± 0.05) units, based upon continuous monitoring, the liquidated damages will be $10 per million gallons after 60 minutes of non-compliance. Similarly in another example, if the turbidity (individual filter effluent) is above specified values, the liquidated damages will be $50 per million gallons and the liquidated damages will be doubled after 1 hour.

BEST VALUE PERSPECTIVES IN PPP/DBFO/BOT FRANCHISEE SELECTION

Dwindling governmental resources fail to meet burgeoning demands for new and expanded infrastructure facilities that have been fueled by increasing population and rapid urbanization. This shortfall has generated more 'creative' procurement routes to public infrastructure development, among which the 'Build-Operate-Transfer' (BOT) approach has been recently revived worldwide. In addition to mobilizing private sector funds, the increasing popularity of BOT stems from the recognition that some project development processes can be more efficiently handled by the private sector. For example, the World Bank has pointed out that cost overruns and delays are common in purely public sector procurement, thereby negating any benefits from the preferential interest rate on loans given to governments. Current public works procedures have been identified as inefficient, for example, involving long and complex planning procedures and sequential working methods (Mitrovic, 1999). These have also led to project disruptions and general complexities, which have in turn increased costs and duration further. All these have propelled the push towards DBFO/ BOT type procurement in particular and Public-Private Partnerships (PPP) in general.

Best selection values

Public clients target three main objectives in choosing the PPP/ BOT procurement route. Firstly, they provide a legitimate vehicle to mobilize evidently available private funding for the production of public infrastructure. Secondly, they facilitate a convenient transfer of risks to the private sector. These transferable risks include (Higher Education Funding Council for England, 1997):

(1) Design and construction risks: the concessionaire is responsible for not only the initial design and construction of the project, but also for its operation and maintenance throughout the usually long-term concession period. The concessionaire needs to find a solution to minimize the whole life cycle cost of the project.
(2) Operating risks: services provided by a BOT project are usually paid for on the basis of the agreed quality and availability of the services within a specified time. Penalties (either in liquidated damages or in reduced payments or non-payments) would be applied for delayed or low standard services.
(3) Revenue stream risk: BOT projects are in fact financed by the revenues generated throughout the operation period. There are many factors that could affect the project revenue, for example fluctuations in currency exchange rate if the project is financed by foreign currency but the service is paid by the local currency.
(4) Technological obsolescence: technologies used to provide the services may become obsolete well before the end of the concession period, particularly for high technology and IT projects.

The third objective of PPP/BOT type procurement is to obtain better value for money (e.g. in terms of reduced costs and enhanced services at lower prices) than along a traditional procurement route. This judgement can be made by comparing the net present value of costs of the BOT scheme with that of a similar reference project procured by the traditional route, assuming that the full range of services of the BOT arrangement would be provided in the reference project i.e. including capital investment, design, construction, operation and maintenance. If other things are assumed to be 'equal', the scheme with the lower total net present value of cost streams can then be said to be better. Moreover, the proposals submitted by different potential concessionaires should also be compared along these lines, i.e. in targeting better value against the various relevant criteria.

In illustrating some expert opinions on this issue, Table 2 presents a consolidated summary of collective perceptions of best value contributing factors in BOT projects, as derived from a questionnaire survey on procurement of Build-Operate-Transfer type projects. The survey was conducted for a Ph.D. research project (Zhang, 2001) and rankings for best value factors were derived from a consolidated summary of 46 responses (that include 29 from industry and 17 from academia; 12 from public sector, 24 from quasi government and 10 from private). The respondents were from 42 different organizations/institutions around the globe.

Best value factors	Rank
Transfer of risks related to construction, finance and operation	1
Reducing the size of public borrowing via off balance sheet financing	2
Early project completion/ product or service delivery	3
Acquisition of a fully completed and operational facility	4
Low project life cycle cost	5
Additionality (acquisition of facilities that would otherwise not be built by the public sector)	6
Low tariffs/ tolls	7
Long project life span	8
Benefits to local economy	9
Increased project development and operation efficiencies	10
Reduced disputes and claims	11
Optimized resource utilization	12
Additional financial sources for priority projects	13
Reduced public administrative costs	14
Improved constructability and maintainability	15
Environment friendly	16
Utilization of private managerial skills and technologies	17
Transfer of technologies	18
Technical innovation	19
Modular and repeatable design/ construction	20
Additional facilities/ services beyond client requirements	21

Table 2: A summary on common best value factors considered in BOT-type projects [2]

[2] *The above rankings were derived from a consolidated summary of 46 responses to a recent survey on "Procurement of Build-Operate-Transfer (BOT) type projects". The respondents were from 42 different organizations/ institutions around the globe. The survey was conducted for a Ph.D. research (Zhang, 2001).*

Franchisee selection

Traditional contractor selection techniques will fall short in assessing the multiple criteria that need to be evaluated in potential PPP/BOT type franchisees. For example, the financial, organizational, managerial and operational capacities need to be carefully assessed. Given such multi-functional capacities, the tenderers are usually consortia that bring together many companies. Each such consortium may not have a significant track record by itself. Evaluation criteria include compliance with all franchise requirements, quality deliverability, aesthetics, durability and functional/ technical factors, finance, operational/ maintenance capabilities, safety, environmental impacts and price/toll/tariff levels.

The multi-attribute utility analysis (MAUA) and the Kepner-Tregoe decision-making technique (Kepner and Tregoe, 1981) are two commonly used techniques for BOT tender evaluation. In both approaches, the BOT tender is first evaluated in terms of several independent packages (e.g. legal, financial, technical, operational and environmental). These are assigned different weights according to their relative importance. Each proposal is evaluated with scores given against each sub-criterion. The proposal with the highest final total weighted score is chosen for the concession. The Kepner-Tregoe technique differs from the MAUA in that the former classifies the various criteria into MUSTs and WANTs. The MUST criteria are mandatory, functioning as a screen to eliminate non-conforming tenders. Those tenders which 'pass' all the MUST criteria are next evaluated against the WANT criteria. The MAUA technique proceeds directly to this stage. Zhang et al. (2002) provide more details of these approaches along with examples of application of the Kepner-Tregoe approach in BOT procured tunnel projects in Hong Kong.

Critical success factors in BOT tendering

The critical success factors (CSFs) that contribute to effective BOT tendering have been discussed by Tiong et al. (1992), Tam (1995), Tiong (1996), Morledge and Owen (1997) and Gupta and Narasimham (1998). Tiong and Alum (1997) have identified the distinctive winning elements (DWEs) in the three main CSFs: (1) technical solution advantage, (2) financial package differentiation and (3) differentiation in guarantees. For example, there are six main DWEs for the CSF of financial package differentiation: lowest tolls or tariffs; strongest financial commitments; lowest construction cost; highest ratio of equity to debt; largest revenue or profit sharing with government; and shortest concession period (Kumaraswamy and Zhang, 2001).

BEST VALUE FRAMEWORK FOR SOURCE SELECTIONS

An appropriate choice of the 'right' band of bidders/ proposers and the development of co-operative/ collaborative relationships with them, could be potentially useful in minimizing the transaction costs and enhancing harmony and overall value (Rahman et al. 2001). Thus, the pre-bid contractor selection tasks such as certification, registration, prequalification, short-listing to the optimum number of bidders/ proposers is also significant in contributing to the ultimate best value. Furthermore, the best value focused contractor selection should target both intrinsic and extrinsic aspects of best value, which may be in 'tangible' (e.g. cost savings) and 'intangible' (e.g. enhanced harmony and relationships) forms. 'Value for money' is an indication of the extent to which the benefits would match the costs incurred (Male, 2001). Several research papers such as by Gransberg and Ellicott (1996) and Gransberg (1997) discussed the illusion of apparent cost savings through 'purely price based' contractor selection. The 'best value' to be targeted in contractor/ consultant selections could be gauged by several 'utility' parameters. For example, Singh (1998) suggested considering an 'overall profitability index' of bidders as one of the contractor selection criteria. Similarly, a checking method for contractor's financial capacities using a 'profitability trend analysis' is prescribed by the Environment, Transport and Works Bureau (ETWB), Hong Kong – according to which, a contractor's 'average loss rate' over past 3 years should not be more that 30% of his 'net worth' (ETWB, 2002d). Several multi-criteria evaluation strategies such as the additive model using multi-criteria utility theory (Hatush and Skitmore, 1998) could be used for contractor selection. For example, a simple weighted additive model for value based alternative selection as per DeMonsabert et al. (2003) is as follows:

$$V\left(ALT_j\right) = \sum_{i=1}^{k}\left(w_i * v_i\left(X_{ji}\right)\right)$$

in which, i = index of criteria; k = total number of criteria considered for decision making; j = index of alternatives (ALT); X_{ji} = criteria i for alternative j; v_i = value function for i^{th} criteria; and w_i = weight for i^{th} criteria.

However, in order to potentially improve the 'best value' focus, such selection models should be further augmented with additional filtering arrangements and appropriate 'sensitivity analysis' and 'trade-off analysis' between various alternatives and evaluation criteria. For instance the United States Army Material Command (1998) recommended a 'price realism analysis' and 'cost versus quality' trade-off analysis for the best value contractor selections.

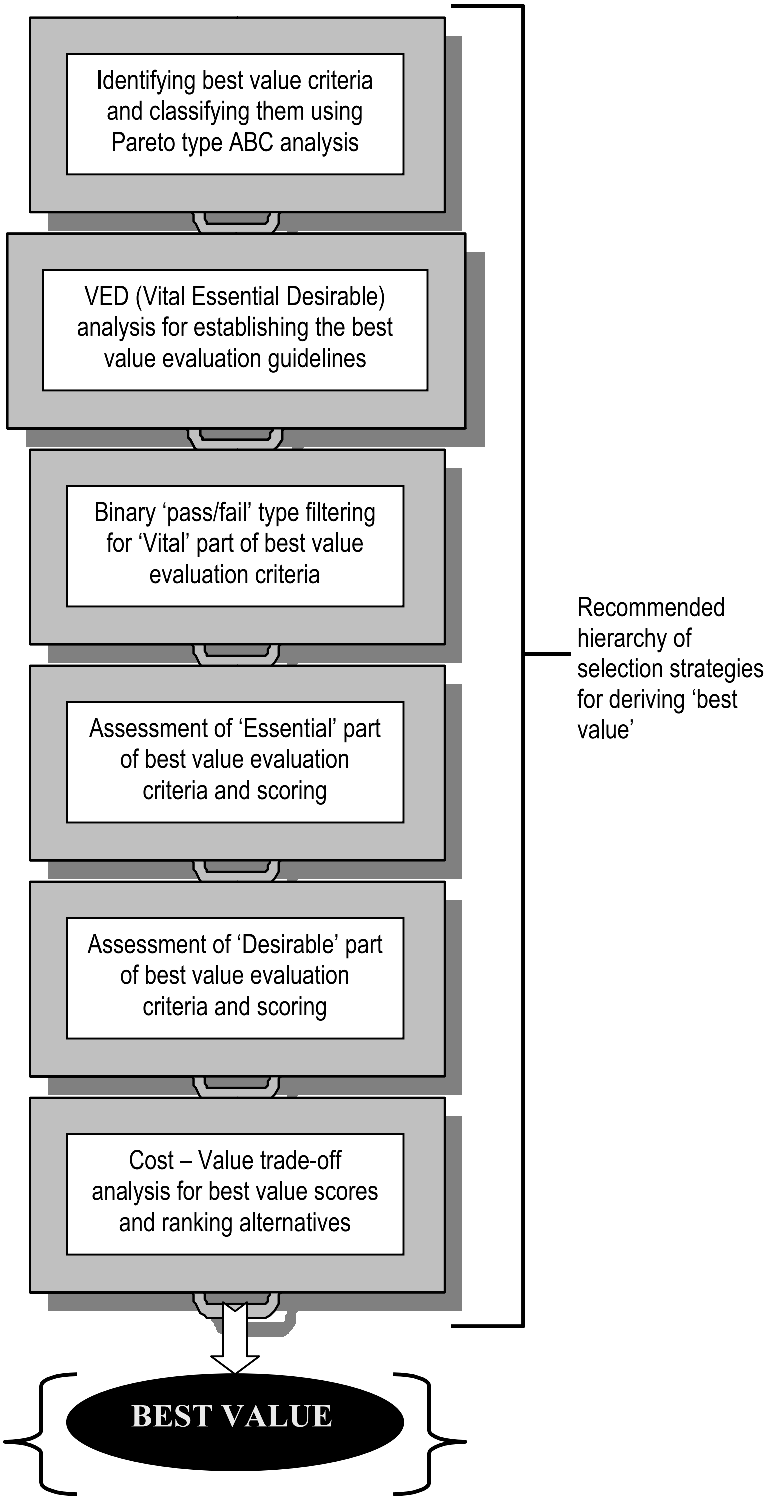

Figure 2: Conceptual framework of proposed best value focused contractor selections

Figure 2 portrays a conceptual framework of the proposed best value focused contractor selection model developed by the authors as a basis for expansion according to different procurement scenarios. In this proposed framework, the best value criteria should be identified at the outset, by matching the client objectives and project requirements. Those best value criteria should be analyzed in a 'Pareto' type ABC analysis (i.e. 80 percent of cost may be incurred in just 20 percent of items only) to determine their cost-effective significance. Then, a VED ('Vital'– 'Essential' – 'Desirable') analysis should be used to establish best value evaluation guidelines. A 'pass/fail' type binary filtering strategy will be used for checking the 'Vital' part of best value criteria (as in the 'MUSTS' part of the Kepner-Tregoe technique). For example, in a recent technical circular of the ETWB, Hong Kong it is suggested to reject 'unreasonably low' bids by assessing the reasonableness of bids by taking the following into account (ETWB, 2003):

- prices, including overall prices as well as any unit rates for major items, quoted by other contractors or consultants who have submitted tenders or bids for the contract or consultancy
- pre-tender estimates for the contract or consultancy
- prices, including overall prices as well as any unit rates for major items, quoted by the successful tenderers or consultants in recent tender exercises;
- market rates for major items, if available from other sources
- cost build-up rates, including staff rates
- whether the price is heavily front-loaded

After verifying the 'vital' mandatory requirements, suitable multi-criteria assessment and scoring methods (e.g. simple additive weighting, analytic hierarchy process) should be used for evaluating and scoring the 'Essential' and 'Desirable' parts of the best value criteria. In the final stage, a 'Cost – Value' trade-off analysis should be used to select the potential best value contractor. For instance, if the difference between two alternatives in best value analysis is "n%" and the corresponding difference in costs is "x%", then such differences should be verified with some key questions such as 'is it necessary to consider the added value/ best value', 'how much more should be paid in order to achieve benefits from such added value /best value?' and 'does the added value justify (or even 'exceed') the additional costs?' Furthermore, 'value engineering' approaches may be applied in eliminating items in bids/ proposals that do not add any value. Thus, in the proposed basic model of a best value contractor selection approach, the prime focus lies in establishing a structured framework of what value the clients wish to achieve, where and how those value contributors exist, and how those value contributors could be evaluated in terms of both objective and subjective indicators.

However, 'soft' strategies such as partnering arrangements and award/ bonus/ incentive mechanisms would be useful in ensuring and enhancing the realizable best value for the contracting parties and the end-users. Ongoing research in a project for developing an integrated MSS (Management Support System) is presently formulating a working prototype system for best value focused source selections for 'large' construction clients. Subsequent testing and validation of the prototype will be useful for improving the framework and the system for possible implementation in client organizations.

SUMMARY AND CONCLUSIONS

Best value should be the ultimate goal in every contractor selection exercise. Several approaches such as direct selections, competitive negotiations, cost/ design competitions, cost competitions and purely technical quality based competitions are all used for source selections. Some good 'source' selection practices that target best value are briefly enumerated in this paper with the twin objectives of dissemination and future benchmarking. Although, best value selections should yield economical and other strategic benefits in the long term, some clients opt for 'desired value' instead of 'best value' due to some of their other constraints, such as budget limitations. Consolidating such viewpoints and practices, a best value framework has been conceptualized and presented in this paper. Establishing such structured best value based contractor selection strategies (with repeatable standards) will be beneficial to both clients and their contracting 'counter-parties' (e.g. contractors and consultants) in the long run. However, in order to derive benefits on a sustainable and 'continuously improving' basis, all such 'best value' seeking procurement strategies should include suitable 'relational' elements (such as mechanisms for partnering or alliancing). The 'relational' bonding elements, as derived from 'relational contracting' principles, would enable if not empower enhanced communications, equitable risk sharing, greater mutual trust, and effective pain/gain sharing mechanisms and incentives for close collaboration towards achieving mutually aligned objectives. Furthermore, it is believed that the development of appropriate computerized systems (with suitable artificial intelligence back-end support) should assist in decision support and objective evaluations in such complex and apparently 'fuzzy' decision-making tasks of best value focused 'source' selections.

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