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Public Sector Perceptions of Early Contractor Involvement for Delivering Social Infrastructure

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Abstract
There have been widespread calls for the public sector to use of non-traditional delivery methods so as to obtain better 'value for money'. Early contractor involvement (ECI) is one form of delivery approach that has begun to attract the attention of many Australian State Governments, as it allows a contractor to proactively participate in design development, risk management and the construction programming processes. Design and construction processes can also be integrated which therefore overcomes the impediments and barriers that have conventionally existed between designers and contractor. Within Western Australia (WA) the use of ECI has been limited in application. Using questionnaire surveys and semi-structured interviews, this research sought to determine the perceptions of public sector representatives about the benefits and barriers of implementing ECI. Findings revealed that a significant proportion of contractors did not have the capability and experience to be involved within an ECI approach. Their preference was the use of a traditional lump sum method. Where there was limited scope for using competitive tendering, particularly on large complex projects, then ECI could be a preferred option for future projects. The paper recommends that the public sector begin to educate designers and contractors about the benefits of using ECI.

Keywords
Design, construction, early contract involvement, value for money, Western Australia

1. Introduction

As a result of buildings becoming more complex, the construction industry has become more specialized, which has resulted in the segregation of a project delivery process that was formerly directed from inception to completion by one master builder (Puddicombe, 1997). This specialization has resulted in the establishment of numerous separate entities, which have become fragmented and resulted in design and construction processes becoming separated from one another. The fragmentation that has tended to prevail has adversely affected relationships between various parties, which have tended to be adversarial rather than co-operative in nature (Gyles, 1992). The separation of the design and construction processes has been heavily criticized and identified as inhibiting innovation and the industry's performance and

productivity (e.g., Emmerson, 1962; Egan 1998). Similarly, Egan (1998) identified that the construction industry typically deals with the project process as a series of sequential and largely separate operations undertaken by individual designers, contractors and suppliers, who have no stake in the long term success of the project, and therefore, no commitment to it. Task specialization has enabled organizations to foster and develop specific skill sets through repetition and learning. Yet, the objectives and goals of organizations who are involved with a project's delivery invariably differ from one another delivery (Love *et al*., 1999). Consequently, organizations may not understand how their practices and decisions impact others in the production process (Love *et al.*, 2000). Such misunderstanding can contribute to need change orders and conflicts, which can a significant impact to project budgets and schedules (Love *et al.*, 1998). To overcome the fragmented structure and separation of design and construction processes, an 'integrated project delivery' strategy is needed to improve project performance and productivity (Love *et al*., 1998; Kent and Becerik-Gerber, 2010).

Integrated project delivery has been described as a process that collaboratively harnesses the talents and insights of all project participants to optimize project results, increase value to the owner, reduce waste and maximize efficiency through all phases of design and construction (AIA California Council, 2007). One such method that enables project integration is the use of *Early Contractor Involvement (ECI)*. According to Mosey (2009) consultants cannot solely develop a comprehensive design solution that is buildable and innovative. Despite ubiquitous calls for the use of integrated procurement forms to be used to deliver public sector infrastructure so as to obtain value for money (V*f*M) the Western Australian (WA) public sector has been reluctant to embrace this strategy as traditional lump sum tendering (TLS) has been considered its *bastion* for procuring social infrastructure (Love *et al*., 2010). Recognizing the need to consider alternative procurement strategies the public sector has begun to explore and implement other alternative approaches such as Public Private Partnerships (PPP) and management contracting. ECI has, however, been very rarely used within WA, and as result this paper examines the perceptions of key decision-makers, who are integrally involved with the selection of procurement strategies, about the benefits and barriers associated with using ECI for social infrastructure delivery. The research is reported in this paper is considered to be very pertinent since the global economic crisis (GEC) occurred there is a danger that many Western public sector agencies may begin to go 'back to the future' by reverting to implementing TLS methods, as there is a reverent perception that they can provide lower costs and better V*f*M, irrespective that research has proven otherwise (Cheung and Yiu, 2006). In the authors' view is that ECI will continue to be an important embedded feature of procurement methods, irrespective of the changing economic, social, professional and environmental conditions applicable at the time. The advantages of ECI are so great in many procurement situations that its use will continue unremittingly.

2. Early Contractor Involvement

ECI focuses on the conditional appointment of a contractor into the project team at the preconstruction stage. As a result, this enables the contractor to participate design development, risk management and the construction programming processes (Mosey, 2009). This process allows for the integration of the design and construction parties, which is not facilitated when a traditional design-bid-build procurement strategy is used (Tatum 1987). Early integration not only allows the contractor to contribute to the design and planning phase, but also improves communications between the client and project team members.

To effectively incorporate a contractor into the pre-construction phase, a two stage tender process has been advocated as denoted in Figure 1. This process enables a degree of competition for contractor selection to be maintained, as well as facilitates their early involvement. Selection is typically based on a submission by the contractor in terms of profit margin, overheads, pre-construction stage fee, approach to risk pricing and any other cost components that can be priced accurately by the contractor, based on the contract information that is made available to them (Mosey, 2009). In addition to the price based criteria, the contractor is assessed against qualitative criteria such as the proposed construction method, ability to deal with unanticipated problems, ability to deliver similar type projects on schedule, experience with

similar projects, familiarity with local subcontractors and suppliers (Wong *et al*., 2000). On *conditional* appointment, the contractor actively contributes to the delivery process through design reviews, cost comparisons (in conjunction with the cost consultant), development of the construction programme and risk management analysis (Tatum, 1987).

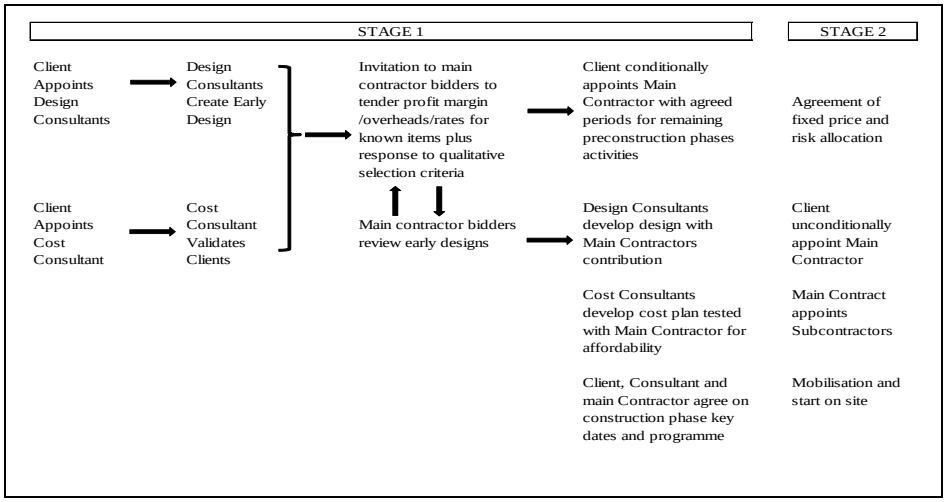

Figure 1. Two stage pre-construction phase (Adapted from Mosey, 2009)

The second stage is the *unconditional* appointment of the contractor. At this stage the contractor is typically required to provide a guaranteed maximum price (GMP) for the delivery of the project. The procurement process for the second stage can take numerous forms as the contractor can be appointed using a:

- *traditional construct only contract*: In this instance, the client retains the responsibility to complete the detailed design and the contractor is required to undertake construction of the project;
- *design and construct contract*: The contractors assumes responsibility for both the detailed design of the project as well as the construction of the project.
- *novated design and construct contract*: Under this form of contract the design team, engaged by the client for developing preliminary design documentation, are novated to the contractor for detailed design and implementation phases of the project.
- *managing contractor* (at risk): Here the client appoints a contractor to manage the design and delivery phase for a 'management fee'. The term 'at risk' is often used where the contractor is required to provide a negotiated GMP for the construction prior to their engagement. Thus, the risk of cost overrun is transferred to the contractor

The advantages of ECI two stage process have been recognized by the Queensland State Government, in which through its utilization, suggest the first stage results in a more robust identification of risk and a realistic project schedule and price being defined (Queensland State Government, 2008). The second stage is recognized for its ability to enable risk negotiation and the establishment of a GMP, which can reduce 'change orders' and excess project contingency fees that are associated which traditional design-bid-build procurement (Queensland State Government, 2008).

2.1 Benefits of ECI

A contractor's input during the pre-construction process can significantly improve project design, specification and stimulate innovation. In addition, they can also significantly improve planning and scheduling and therefore reduce a project's construction period (Mitropoulos and Tatum, 2000). This is

achieved through the contractor constructability input into the design phase (Tatum, 1987). In particular, Wong *et al*. (2006) have suggested that constructability enables the:

- economic use of contractor resources;
- design requirements to be easily visualised and co-ordinated by site staff;
- contractor to develop and adopt alternative construction details;
- contractor to overcome restrictive site conditions;
- incorporation of standardization and off-site manufacture;
- simplification of construction details in case of non repetitive element; and
- design to achieve safe construction sequences on site.

As noted above, the tender process for the appointment of a contractor under the ECI model is not based purely on price. The ECI model and approach to tendering is beneficial for the contractor, as it allows them to differentiate themselves from competitors based upon their expertise, experience and capability (Mosey, 2009). This can contribute to reducing a contractor's bidding costs, as resource requirements for arbitrary tendering are reduced. The elimination of competitive tendering may be seen in a positive light by contractors, however, public sector clients may perceive that this process may result in inflated prices (Love *et al*. 2008). Yet it has been recognized that the clients, especially the public sector, need to move away from competitive tendering, if innovation and V*f*M are to be attained (Egan, 1998)

The cost of a project is often the most important consideration for a public sector client (Love *et al*., 2008). The participation of a contractor during the conceptual development and planning stage is essential for project cost efficiency as it ensures more informed decisions are made, scope is adequately defined, design is matched with construction needs and constraints and whole life cycle costs can be optimized (Business Roundtable, 1982). Accordingly, NEDO (1975) observed that a two-stage tendering process can significantly contribute to improving price certainty within plus or minus 5% of the final contract sum. With ECI being able to ameliorate price certainty, the propensity for disputes to arise is mitigated (Cicmil and Marshall, 2005). Additionally, relationships and trust can be established earlier between project team members and therefore alternative dispute resolution procedures can be used to resolve conflicts, should the need arise

ECI can enable the client and consultants to compare their risks against those that are developed by the contractor and specialist subcontractors. Risks can be analyzed and risk management strategies can be agreed on and implemented prior to construction on site (Jergeas and Put, 2001). Consequently, this can prevent contractors from being exposed to risks that they have little or no control over. Fundamentally, risk should be allocated to those parties that are able manage them effectively. Love and Davis (2009) suggest that equitable risk allocation has the ability to reduce a client's construction costs, as the party in the best position to manage a particular risk is able to do so at the lowest price.

2.2 Barriers to the Implementation of ECI

To acquire the early participation of a contractor in the pre-construction process, a level of remuneration is invariably required (Mosey, 2009). As a result, it is often perceived that additional money is being spent by a client that would not have been required under a traditional single stage tender. Yet, despite this misconception, it has been reported a cost multiplier of 10 to 20 times the actual remuneration paid can be attained from ECI (Atkinson *et al*., 1997). ECI costs, however, remain a risk to the client, as there are no guarantees that the contractor can provide a fixed price that is suitable for their appointment to construct the works (Mosey, 2009). This can result in the client having to seek an alternative procurement method, in which part of the value gained from the early contractor involvement is lost. Additional costs can incurred prior to the appointment of the contractor, as a result of the need to evaluate the first stage tender submissions on a wider range of criteria, including qualitative factors as opposed to simply price

alone (CIRIA, 1998). This is therefore, more demanding for the client and consultants to assess, in turn requiring more resources, including finances (NEDO, 1975).

The traditional procurement model has been recognized for its ability to facilitate competitive pricing through a single stage tender. This process often results in tenders based on very low profit margins, therefore providing the lowest possible price for the client. As the ECI model appoints a contractor to the construction phase through a negotiated process, there is the perception that a lack of competition will inflate prices. The opportunity of inflating prices is limited in the two stage tender model as the contractor is required at the initial tender stage to disclose their profit margin and overheads (Mosey, 2009). In the first stage of the pre-construction phase, the contractor has no guarantees that they will be appointed to undertake the construction of the project. Thus, the contractor may limit the amount of information and knowledge they are willing to divulge prior to the awarding of the construction contract (Pozzebon, 1996). Contrastingly, methods of construction adapted in the design stage can be guided by a contractor so that it favors their selection; if the negotiation stage fails, and a competitive tenders take place then the contractor can have an advantage over other competitors (Mosey, 2009). In such a case, a contractor may seek to use this leverage to inflate their construction price and reduce their level of risk exposure.

According to the Government of Western Australia (2010), the ECI model provides no guarantee that after the completion of the pre-construction phase, the design development, pricing and risk analysis will meet a client's needs in terms of their brief, budget and timeframe. This may result in the need to disengage the contractor and select another through an alternative form of procurement route. In this instance, time and cost increases may arise, with a significant portion of the project's 'value' established with the contractor being lost (Government of Western Australia, 2010).

ECI requires project participants to work in a cooperative manner. In spite of this, the division that exists between design and construction has been so institutionalized, that people from different organizations have lost some of the respect for and ability to work cooperatively with one another (Pocock *et al*., 1996). This view has also been identified by the Business Round Table (1982), who states that a key barrier that prevents integration of parties is the reluctance of architects and engineers to accept input from construction personnel.

3. Research Approach

ECI is a procurement strategy that has received limited attention within WA and a plethora of factors are taken into account when selecting a procurement strategy by public sector clients (Love *et al*., 2010). To gain an insight about a public sector agencies views about ECI and its potential application for delivering social infrastructure in WA an interpretative research approach was adopted. Such an approach can capture information about the beliefs, actions, and experiences of policy makers involved in the procurement selection process.

3.1 Data Collection

The director of a WA public agency, responsible for delivering social infrastructure was approached and invited to participate in the research. Upon agreement, personnel from the department were invited to participate in the research. All members of the department agreed to participate and as a result a questionnaire survey was distributed to individuals. The aim of the survey was to obtain a reference point of current practice and participant's knowledge of ECI. The questionnaire survey sought information about the respondents background (e.g., role, experience, etc), current organizational practices relating the types of procurement methods and tendering methods used, knowledge and experience with ECI, and perceptions of ECI. A Likert scale ranging from '1' (not at all) to '5' (to a large extent) was used to obtain

participants perceptions of the influence of ECI on performance outcomes and project related factors. A total of 30 surveys were distributed and returned.

Semi-structured interviews were then undertaken with respondents who answered the questionnaire survey to gain further insights and views about ECI. An outline of topics and issues to be covered was developed, but as the interview unfolded the wording and order of the questions varied to some extent. The interviews followed the same themes that had been identified in the questionnaire survey. Interviewing of this nature requires a relatively skilled and experienced interviewee who needs to know when to probe for more in-depth responses or guide the conversation to make sure that all topics contained within the outline are covered. In this case, an interviewer with extensive research and industry experience was used to conduct the interviews.

Thirty interviews were conducted over a three week period with all members of the department involved with the selection of a procurement method: director (1), project manager (24) and project officer (5). The interviews were conducted at the offices of interviewees. Interviews were digitally recorded and transcribed verbatim to allow for the nuances in the interview to be apparent in the text. The interviewees' details were coded to allow for anonymity, although all interviewers were aware that it might be possible to identify them from the content of the text. The nature of the questions allowed for avenues of interest to be pursued as they arose without introducing bias in the response. Notes were taken during the interview to support the digital recording to maintain validity. Each of the interviews varied in length from 30 minutes to one hour.

4. Research Findings

Respondents has a vast range of experience working in the construction industry with 54% having more than 10 years, 17% six to 10 years, and 30% one to three years. The period working within the public sector ranged from 50% more than 10 years, 10% six to 10 years, and 40% one to three years. The findings reported in Love *et al*. (2008) revealed the agency predominately used TLS methods to procure their projects. In 2010, when this research was undertaken, it was revealed that TLS was still the predominately used form of procurement, with design and construct, novated design and construct, and construction management being rarely used. Single stage selective tendering was identified as the main method of price determination, with two-stage tendering being used occasionally and negotiation in some circumstances. 90% (27) of respondents had never had any experience with ECI. Respondents possessing experience with ECI have acquired this while working on projects within other state jurisdictions.

The survey and interviews sought to determine the perceived influence of ECI on an array of project performance parameters such as time performance, quality, safety, and schedule. It was generally perceived that reduced disputes, claims and time and cost performance would occur with the use of ECI. Improved constructability, risk identification and management, client and contractor relationships were identified as the primary project related factors that would occur should ECI be used for a project. Innovation, improved contract documentation and determination of whole life cycle costs were perceived to only be marginally beneficial attributes of ECI. The barriers to ECI that were identified were a reduction in competitive tendering, a fear of opportunistic behavior by the contractor and the client and contractors limited experience. The lack of contractor resources and experience in the WA marketplace was repeatedly identified during interviews as a barrier to using ECI. It was perceived that only the large contractors who had access to resources and experience from outside of WA could adequately undertake the role required by using ECI. Statements obtained from the interviews, such as those identified below, clearly illustrate that a lack of competition and experience are influencing the public sector's choice of procurement method:

> "ECI results in a loss of competitive advantages gained through competitive tendering, especially when the industry is slow and the level of competition for project is high".

> "Traditional tendering is well-regarded as it is a true test of the market".
>
> "Competitive tendering is a tradition that has gone back a hundred years. In the public sector it is about money only, going to tender and going for the lowest price".
>
> "Limited numbers of contractors have the ability to undertake a contract which incorporates ECI. In fact, I don't think contractors in WA would have the confidence or ability to get involved with this approach".

During the interviews respondents were asked to describe the decision-making resources that were available to assist them to determine if ECI would be an appropriate procurement method. It was noted that there was a procurement selection toolkit was available but it was only being used on projects with a contract value of above A$50 million. Procurement methods for projects with an estimated contract of less than A$50 million were selected using the project manager's or director's experience and intuition.

5. Conclusion

It would appear that the public sector in WA is very aware of the potential benefits that can be attained from implementing ECI. Unfortunately, however, there appeared to be great deal of skepticism that benefits espoused by ECI would materialize in practice. A pervading barrier that came to light was remunerating the contractor for their input and services during the pre-construction. It was perceived that contractors were generally opportunistic and would use the process to their advantage by inflating construction prices and imposing their own unique construction methods. The elimination of competitive tendering was also deemed to be problematic. Issues associated with probity and accountability repeatedly can to light during the interviews as it was continuously suggested that traditional lump contracting was the most reliable method of procurement and provided cost certainty. Love *et al.*'s (2008) observations of culture *uncertainty avoidance* were clearly evident; decision-makers opt to use a TLS as a mechanism to alleviate uncertainty and ambiguity that are associated with alternative procurement methods. Despite widespread evidence identifying the problems with TLS, the WA Government continually use this form of delivery method for a significant proportion of their social infrastructure projects. In doing so, the State has unintentionally disadvantaged itself as the marketplace has limited experience in using alternative delivery methods and opportunities for innovation and V*f*M are being stifled. Moreover, the reliance on TLS has resulted opportunities to gain knowledge and experience of alternative forms of procurement to be lost. Ironically, major barrier to implementing ECI was limited knowledge and experience of the public sector, designers and contractors, particularly those of a small to medium size.

Surprisingly, however, it was suggested that ECI could be considered for use on high risk projects where limited competition will be gained through competitive tendering or where specific government policy outcomes needed to be addressed through procurement. In this case, if ECI is used on high risk projects where it has not been previously 'tried and tested' previously, then there is high probability that cost and schedule increases will be experienced. The public sector needs to educate designers and contractors about the benefits of using ECI as well as other forms of procurement method. The use of workshops and 'best practice' exchange forums would provide the knowledge and insights needed to experiment with ECI. For example, before trailing ECI on a high risk project, it would more appropriate to use on a project where there is minimal risk, such as school so that experience can be gradually acquired. If not, then there will always be resistance to using ECI and other procurement forms.

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