The application of Early Contractor Involvement (ECI) in different delivery systems in Australia

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Abstract

In Australia, the Commonwealth alongside the states and territory governments are committed to delivering effective and efficient infrastructure projects across the country. To date, over 340 economic infrastructure projects valued at $20 Million or more, account for almost two-fifth of the total value of capital expenditure on major projects. The majority of these projects are delivered under a relationship-based procurement (RBP) method. Amongst various types of relational contracts, Early Contractor Involvement (ECI) is seen as one of the delivery systems and contracting arrangements that owns a number of these projects. Furthermore, the South Australian's Department for Transport Energy and Infrastructure (DTEI), and the Queensland's Department of Transport and Main Roads (TMR) have published a number of documents in an attempt to standardise the ECI contract as practiced in Australia. Despite the evident documents indicating the ECI as a form of binding contract, many academic and industrial professionals use the term as a concept too. From their perspective, ECI refers to engagement of the contractor at the early stage of project development and can happen through a wide range of methods. This paper, therefore, studies different delivery systems that incorporate the concept of ECI into their implementation process through a literary analysis on the existing scholars and contractual documents.

Keywords: Early Contractor Involvement, ECI, Relationship-based procurement systems, Relational contracting

1. Introduction

In Australia, the Commonwealth alongside the states and territory governments are committed to delivering effective and efficient infrastructure projects across the country. To date, over 340 economic infrastructure projects valued at $20 Million or more including projects in the transport and storage, energy generation, gas, water and telecommunication industries account for almost two-fifth of the total value of capital expenditure on major projects (Productivity Commission 2013). The majority of these projects are delivered under a relationship-based procurement (RBP) method (NICS, 2013). Amongst various types of relational contracts, Early Contractor Involvement (ECI) is also seen as one of the delivery systems and contracting arrangements that owns a large number of these projects. Cairns Bruce Highway Upgrade; Maroochy River Bridge Duplication; North Ward Road in Townsville; Forgan Bridge replacement in Mackay and part of the Bruce Highway Upgrade are examples that have been procured under an ECI contract. Furthermore, the South Australian's Department for Transport Energy and Infrastructure (DTEI), and the Queensland's Department of Transport and Main Roads (TMR) have published a number of documents in an attempt to standardise the ECI contract as practised in Australia (Edwards 2009, Department of MainRoads 2009). Despite the evident documents indicating the ECI as a form of binding contract, many authors and professionals use the term as a concept too. From their perspective, ECI refers to engagement of the contractor at the early stage of project development and can happen through a wide range of methods such as Alliancing, Management Contracting (or Construction Management at Risk), Integrated Project Delivery (IPD), or even a conditional two stage contract in a hybrid design-build delivery method (Caltrans 2007, Van Valkenburg, Lenferink et al. 2008, Mosey 2009, Bongiorni 2011, Rahman and Alhassan 2012). With such diversity in the use of ECI, there is no surprise to face a great deal of confusion when the term is employed in different circumstances. Therefore, further studies around this subject are required in order to offset this ambiguity. This paper, hence attempts to contribute to this clarification process by focusing on different delivery systems that the concept of ECI is incorporated into them through a literary analysis on the existing scholars and contractual documents.

2. Background of ECI

The construction industry has been frequently described as being dominated by a 'culture of confrontation' in which a vicious cycle of mistrust, conflict and waste dominated and has been characterised by adversarial attitudes, with litigation often continuing long after projects have finished (Seymore and Fellows 1999). The industry has attracted a great deal of criticism for its inability to meet the needs of its clients. Australian construction industry was not an exemption either and suffering from the same difficulties as the other construction industries. National Public Works Conference and National Building and Construction Council Joint Working Party (1990) indicated that during the late 1980's, the Australian building and construction industry had substantial increases in the incidence of contractual claims and disputes. This trend continued with increasing disputation and litigation, and win-lose attitudes promoted increasingly with adversarial relationships among project team members. The report also emphasised that no party benefits from circumstances that cause claims and disputes; and that cooperation should be encouraged in the future. The Final Report

of the Royal Commission into Productivity in Building Industry in New South Wales (1992) also clearly indicated the need for a change-to a more cooperative approach to build mutual trust, respect and good faith(Hampson and Kwok 1997).

During the past few decades, the construction industry has embarked on a sustained campaign to overcome its perceived performance problems through a number of initiatives and radically different approaches to the procurement and management of construction projects. Subsequently, emerging project delivery methods increasingly rely on collaboration between the principal, designer and builder, and aim to developing longer-term positive relationships. Relationship-based approaches to project contracting have arisen in response to problems that have intensified as the construction industry has grown over the last few years (Manley 2002).

The Australian construction industry also has utilised a number of innovative variations to "traditional" contract arrangements. The early contractor involvement (ECI) is one of these new approaches developed based on the premise that traditional methods create the team much too late in the project development and there is little scope for innovation and consideration of constructability (Edwards 2009). Nonetheless, the concept of early involvement of contractors is not new and can be traced back to the pre-industrial revolution times when master artisans worked with a client commissioned agent to build large-scale structures. The term, however was formally acknowledged in the industry during 1990s when the concept of builability has drawn academics and practicians interests including the Construction Industry Institute in the US (CII) and its counterpart in Australia (CIIA) (Walker and Lloyd-Walker 2014).

Since then, the term of Early Contractor Involvement (ECI) is widely used in the industry to describe the exploitation of contractor's expertise at the pre-construction stage as an effort to ensure the practicability of design, as well as price accuracy. However, 'Pre-construction' stage is a broad spectrum in a project life cycle starting from the initial phase where a project charter for the idea is developed up to the execution phase when the project is eventually delivered (PMI 2008) thus based on the project context and participants characteristics, ECI can be conceptually visualised at different phases in the project life cycle.

Walker and Lloyd-Walker (2012) mapped various forms of ECI taking place in the project life cycle by adopting the project life cycle model proposed by Williams, Klakegg et al. (2010) and argued that ECI can take place at three of the project lifecycle phases namely internal, project definition and design, and project execution phase. However, the study fails to identify the procurement forms in which elements of ECI exist. The following section aims to define and analyse different procurement models where the concept of ECI is evident.

3. Procurement forms with elements of ECI

Procurement systems broadly can be classified into four main groups namely 1) Separated procurement systems 2) Integrated procurement systems 3) Management-oriented procurement systems and 4) Relationship-based procurement systems. Figure1 illustrates broad project procurement approaches discussed in this section.

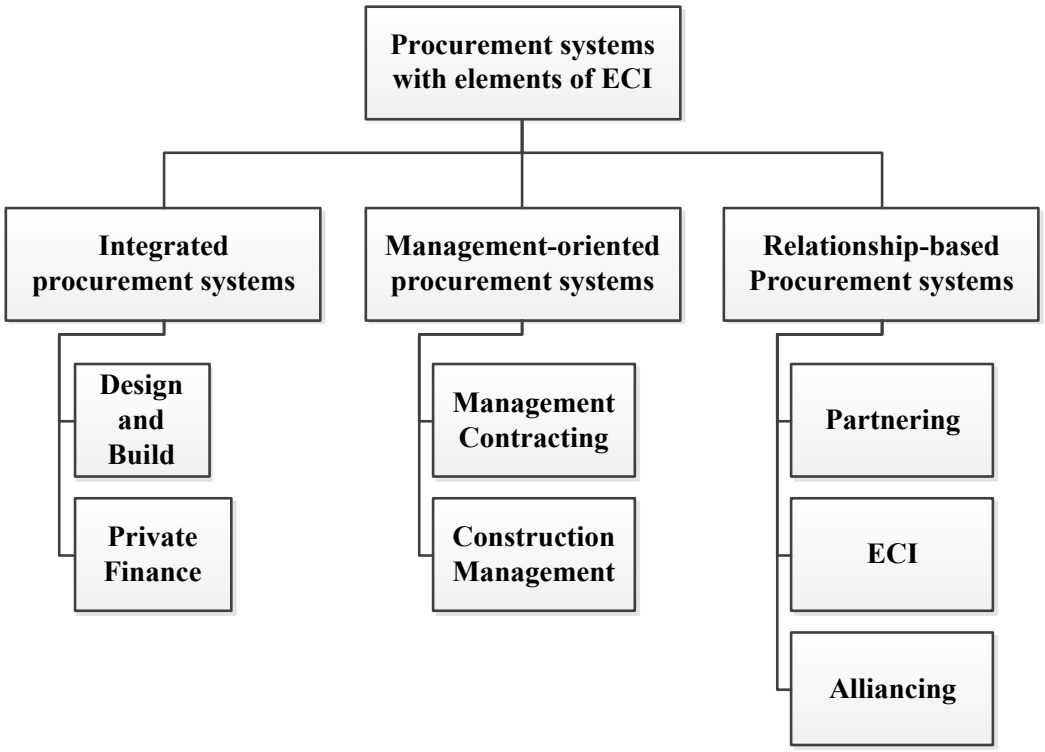

Figure 1: Project Procurement Forms with elements of ECI

Amongst a wide range of diverse forms of construction procurement being practiced in the construction industry, this paper focuses mainly on those models that the overarching theme is participation of contractor in the project before the construction activities begin. Thus, despite the predominance of the separated procurement systems in the Australian market place particularly with many State Government clients (Love, Davis et al. 2008), this study does not include such systems because they exclude the main contractor and subcontractors from the early design and project planning and the contactor comes into the play after design is completed and only during construction phase.

3.1 Integrated procurement systems

Masterman (2002) defines this category as the procurement systems which "incorporate all of those methods of managing the design and construction of a project where these two basic elements are integrated and become the responsibility of one organisation, usually a contractor." (p.40).

Numerous authors have documented a range of diverse methods and related variants that can be included in this category (McDermott 1999, Masterman 2002, Walker and Hampson 2003, Morris and Pinto 2010, Winch 2010, Walker and Lloyd-Walker 2014). The principal members of this category that are dealt here are Design and Build (sometimes referred to as Design and Construct) and Private Sector Finance Procurement Methods.

3.1.1 Design and Build

In Design and Build, a single contractor acts as the sole point of responsibility, normally on a lump sum fixed price basis, for the design and delivery of a construction project in a way that specifically meets the needs of the client (Masterman 2002, Miller, Furneaux et al. 2009).

There are several variants on a Design and Build procurement form, the chief among which are Novated Design and Build, Turnkey and Package Deals.

Novated is a form that the client appoints designer to develop the conceptual design and tender documentation and once the building contractor has been appointed, the 'existing' design team is transferred to this builder.

In *Turnkey* ,as the name implies, the responsibility of the single entity is extended to the installation and commissioning phase along with the arrangement of funding for the project (Walker and Hampson 2003). However, This approach has been largely overtaken by other procurement form under the private financed based forms of project procurement (Walker and Lloyd-Walker 2014).

The *Package Deals* system is the predecessor of Design and Build in which the client purchases a 'ready-made' standard designs for complete building and the contractor provides managing, designing and constructing service for an adopted standard product. This method can be attractive for those clients who can compromise their requirements in an effort to satisfy their building needs timely and at an economic price (Masterman 2002).

As discussed earlier, the project owner in the Design and Build has a contractual relationship for both design and construction with a single contractor. This single contractor can be either an integrated firm mechanism, which has in-house design team as well as a delivery team or a consortium of independent design and construction firms put together for a specific bid (Morris and Pinto 2010, Walker and Lloyd-Walker 2014). In either way, the construction teams provide specialised construction expertise and in-depth knowledge of construction materials, methods and local practice into design and hence their input to design will have a direct impact on the quality of the construction performance (Rahman and Alhassan 2012). Nevertheless, even though the Design and Build integrates the majority of the project supply chain in an attempt to link design and delivery, the whole integration of the design and delivery teams is not in an integrated team (Walker and Lloyd-Walker 2014).

3.1.2 Private Sector Finance Procurement Methods

The terms of Public Private Partnership (PPP), Private Finance Initiative (PFI), Design-Build-Finance-Operate (DBFO) and Build-Own-Operate-Transfer (BOOT) are interchangeably used in different literature while they are all referred to the similar, if not identical, forms of project procurement. The overarching principle of all these terms is the use of private sector finance for design, construct and long term maintenance or operate of public infrastructure projects (Duffield, Raisbeck et al. 2008). The process starts with the project initiator by inviting outline bids from

selected organisations normally a consortium that made up of funder, contractors and operators. The successful bidder will enter an 'upstream' contract with the owner and 'downstream' contracts with constructors, suppliers and service providers. The deal is ultimately concluded when responsibility for the facility is transferred back to the owner after the concession period (Hughes, Hillebrandt et al. 2006). In Australia, private sector finance forms of procurement mainly known as PPPs account for around 10% of state capital spending in Victoria, around 7% in Queensland, and lesser proportions in the other States and the Commonwealth (Regan, Smith et al. 2010).

Since these forms of procurement require very high levels of expertise from all parties, the delivery team need to consist of highly skilled professionals from legal, design, operation experts and construction professionals (Walker and Hampson 2003, Love, Edwards et al. 2011).

Considering the structure of this approach, the major difference in contrast to a turnkey approach is that there is a concern over the balance between long-term operating costs and short-term capital costs (Walker and Smith 1995). Thus, the level of contribution of construction professionals to the design is likely to be similar to a turnkey approach, yet more sophisticated.

3.2 Management-oriented procurement systems

Management-oriented procurement systems are used where the client intends to contract the management of the design and construction out to a contractor who acts as a management consultant on behalf of the client (Rashid, Taib et al. 2006). The route is generally adopted where the early start and completion is of the client's requirement and project is planning and control driven (Morledge, Smith et al. 2006, Walker and Lloyd-Walker 2014). There are two main systems under this category namely Construction Management and Management Contracting.

3.2.1 Construction Management

Under a construction management route, the client employs the design team and instead of allocating risk and responsibility to a single main contractor, a construction manager is appointed to manage the design and construction activities on a professional fee reimbursement basis. The construction manager provides professional construction expertise without any contractual links with design team and contractors, and all design and construction contracts are directly agreed between the client and trade (Package) contractors (Morledge, Smith et al. 2006). Although this approach features extensive use of constructability advices by the construction management team (Walker and Lloyd-Walker 2014), it is generally accepted that the cost certainty cannot be achieved until the final trade contract is closed. Moreover, since there are no binding contracts between construction management party and design team and trade contractors, he assumes no financial risks and is only liable for negligence by failing to perform the role (Morledge, Smith et al. 2006).

3.2.2 Management Contracting

The mechanism of this form is similar to a Construction Management form but with this route, unlike the Construction Management, the management contractor has direct contractual links with all

package contractors. Therefore, the liability of the management contractor extends to the construction works. The main advantage of management contracting is the contribution of the constructor to the design and project planning however, poor certainty of price at an early stage is realised as one of this method drawbacks.

3.3 Relationship-based procurement systems

Relationship-based approaches to project contracting have arisen in response to problems that have intensified as the construction industry has grown over the past decades (Manley 2002). Relationship contracting is the identification, establishment and maintenance of particular relationships with project stakeholders, commercialised and governed so that the objectives of all parties involved are met (Miller, Furneaux et al. 2009). Davis and Walker (2009) suggest that relationship-based procurement leads to mutual benefits in construction business-to-business dealing and provides benefits over traditionally forms of procurement with fragmented supply chains. A relationship-based procurement approach can take many forms. This paper focuses on three forms of it including Partnering, Early Contractor Involvement (ECI) and Alliancing.

3.3.1 Partnering

Partnering is not a procurement choice in itself but a technique for managing cultural environment of project that can be applied to other procurement forms (Masterman 2002, Walker and Lloyd-Walker 2014) . Once culture of partnering has prevailed, parties get to know each other intimately and learn to how the working relationship may be enhanced in an integrated team. Culture of openness and transparency embedded in the concept of partnering (Nyström 2005) enthuses contractors to share their construction knowledge and experience during the design and planning in an attempt to identify major problems that may be encountered during the construction phase leading to the greatest improvement in project performance (Trigunarsyah 2006). Concept of partnering was imported to Australia during 1990s as a means to overcome recognised problems within the construction industry (Walker, Hampson et al. 2000) and now is well established in road construction and maintenance (Manley 2002) . Since then, several collaborative contractual forms have been introduced to the industry, which despite the slight differences in the mechanism, partnering concept is essentially inherent in all of them. Two major forms of partnering include *Strategic* partnering where partnering occurs across a range of projects, and *Project* partnering where the partnering is applied to a range of parties within a single project.

3.3.2 Early Contractor Involvement (ECI)

ECI contract is first introduced by the engineering and construction contract published by British Institution of Civil Engineering in 1998 and adopted by the British Highways Agency for their infrastructure project. As stated previously, ECI contracting arrangement should not be confused with the concept of ECI that can be found in various forms of procurement. In this contractual model, client appoints design and construction professionals early in the project development process through a non-price based selection and those professionals assist the client in planning, assessing buildability and developing an “open book” target cost (Laursen and Myers 2009). In Australia, the ECI contract

is first introduced by Queensland Mains Roads in 2005. Although the method is categorised as the Early Contractor Involvement, it is genuinely an innovative approach, which is not similar to any form of the contract practiced in other countries. The Australian's version of ECI features a two-phase strategy with separate contract for each phase. The first phase includes the design progress from a concept to a preliminary design embracing approximately 70% of the entire design process and is generally similar to an alliancing, and the second phase is completion of the detailed design and construction and employs a typical traditional design and build (construct) contract (Swainston 2006, Edwards 2009).

3.3.3 Alliancing

The concept of Alliancing was developed on North Sea in the early 1990's and imported to Australia at about the same time for development of energy projects. Since then, Alliancing were adopted for numerous projects across Australian governments. A report by Alliancing Association of Australasia (AAA) in 2008 indicates that approximately 300 infrastructure and construction projects with a total value of 90 billion dollars have been delivered through alliancing methods in Australia up to 2008.

Quite succinctly, Alliancing is "an agreement between two or more entities, which undertake to work cooperatively, on the basis of sharing of project risk and reward, for achieving agreed outcomes based on principles of good faith and trust and an open-book approach towards costs" (QGCPO, 2008).

One of the unique features of Alliancing is that a consortium of the project owner (PO), design and construction participants (referred to as Non Owner Participants (NOPs)) forms an alliance for the project and participants agree to make decision unanimously. There are three variations of alliancing. *Project* alliancing, which is the most commonly; *Design* alliancing where it occurs only at the earliest stage; and *Programme and Service* alliancing where alliancing occurs across projects, time and space (Walker and Lloyd-Walker 2014).

4. Discussion and conclusion

There is an increasing perception that alternative procurement systems with partnering principles between project participants could help improving productivity in projects by establishing working relationships amongst stakeholders through a mutually developed formal strategy of commitment and communication. The distinguishing feature of alternative project delivery methods is the ability to involve the construction contractor in the preconstruction phase of a project, providing input to the planning and design processes. This feature is known as Early Contractor Involvement (ECI) amongst academics and practitioners.

The foregoing literary analysis has attempted to demonstrate the contribution of construction contractors to the early design and planning in different procurement systems practicing in Australia. The findings indicate that contractors cannot have much contribution to the design and planning in separated forms of procurement as the level of detailed design specification is generally very high at the time of calling for bids by project delivery organisations. Integrated procurement systems are partially either contractually or physically integrated. In design and build form of procurement, the

design is usually specified in functional performance and often developed from conceptual design drawings. Even though the construction knowledge and experience of contactor influence the project design, absence of contractor at the project definition and conceptual design stage impedes the client to take the full advantage of contractor's expertise when the project is defined and scoped. Management –oriented methods make a possibility for the client to receive extensive advices on buildability or constructability from management contractor in the design development. However, management construction team can be less proactive due to the lack of contractual links with design and delivery parties in the Construction Management system and inadequate management fee in Management Contracting system.

Finally, it was argued that relationship based procurement approaches tend to generate collaborative relationships between the parties involved. Two forms of relationship-based procurement system were described including Early Contractor Involvement (ECI) and Alliancing. ECI is similar to a design alliancing in terms of involvement of the contractor at the front-end phase of project but the process is shifted to a typical Design and Build for the detailed design and construction phase. This inconsistency in the contract process may raise contractor's concerns over opportunistic behaviour that other competitors may be running off with their idea and their contributions to the design, thus the degree of commitment, integration, motivation, skill, teamwork and trust that the contractor is supposed to bring to the project can be undermined.

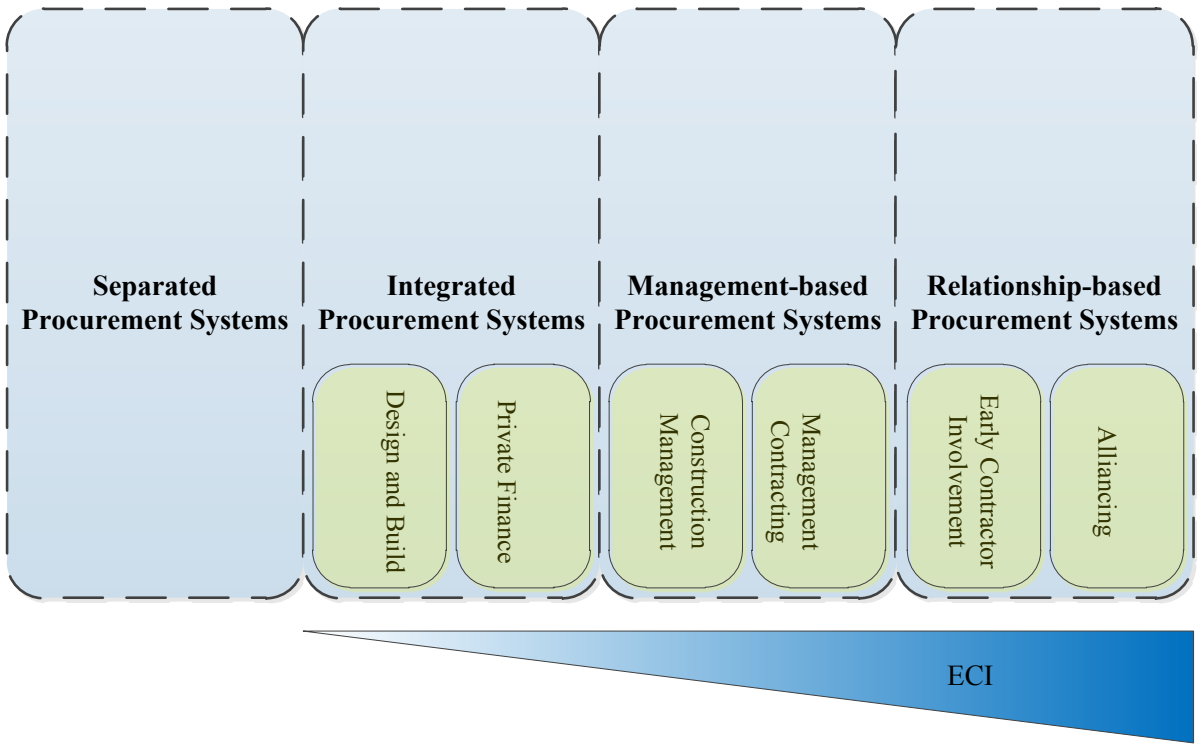

Figure 2: Extent of contractor involvement at the early stage of project in common delivery systems

Alliancing is a form of Relationship-based procurement system that requires a commitment of all parties to common objectives and outcomes. One of the fundamental characteristics of Alliancing is sharing of information, knowledge and skill in a trust-based environment where a non-adversarial culture dominates. In such environment, contractors are willing to share their knowledge and experience in an effort to deliver the project with reduced project cost or reduced overruns of time and cost which will be eventually of their own benefits. Such performances are attributed to alleviating scope definition and planning problems leading to better understanding of project objectives. Figure 2 outlines the extent of contractor involvement at the early stage of project in different delivery systems.

This paper is part of the literature review of a PhD research study under progress by the first author.

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