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# Challenges and opportunities in adopting early contractor involvement (ECI): client's perception

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## ABSTRACT

The emerging project delivery methods increasingly encourage collaboration between the client, designer and contractor to develop longer-term relationship between project parties. In Australia development of Early Contractor Involvement (ECI) was an endeavour to involve the contractor at the early stage of design and planning of a project. While ECI promises benefits to the project outcomes, clients should have a good understanding about this delivery system to make sensible decision as to whether adopt it for a project. Despite the growing use of ECI by public sectors in Australia, there has been limited research that investigated the characteristics of ECI from the client's views. This paper explores the opportunities and challenges in adoption of ECI in Australian through the public client's perspective. Semi-structured interviews were conducted with 25 construction professionals who held senior leadership roles for their departments with several decades of experience in the establishment and delivery of collaborative contracts for complex projects and programmes. The study results show cultural barrier, demonstrating value for money, change in relationship protocol, and inadequacy of contractor remuneration for early stage engagement are the challenges that are most experienced in ECI projects. It further shows that there is inconsistency in the use of ECI within the public sector clients as a result of the ambiguity in the definition of ECI. This study also finds a number of opportunities for clients when ECI is adopted, the chief amongst which are enhancement in constructability, improving working relationship, greater certainty in price and scope, and innovation.

## ARTICLE HISTORY

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## KEYWORDS

Early contractor Involvement; ECI; relationship based procurement; construction clients; Australia

## Introduction

Over the past decades, development of relationship-based approaches to project contracting have arisen in response to increasing problems in the construction industry (Manley, 2002) in an effort to achieve specific business objectives by maximising the effectiveness of each participant's resources and establishing ongoing business relationships (Rahmani, Khalfan, & Maqsood, 2016a). Evidence shows the use of relationship-based procurement (RBP) could improve project performance and offer direct benefits to the whole supply chain (Walker & Hampson, 2003). Among different RBP methods, Early Contractor Involvement (ECI) has emerged as a new construction procurement approach that typically is utilised for complex projects to alleviate uncertainty and manage risks more effectively (Eadie & Graham, 2014). Originated in the UK in 1998, development of Early Contractor Involvement (ECI) is an endeavour to involve the contractor at the early design and planning stage

of a project to improve the project outcomes including cost, time, quality, and working relationships (Rahmani et al., 2016a).

In Australia, ECI is adopted and contextualised from the British version in 2005 for delivery of a number of projects mainly in the road and rail sectors (Campbell & Minns, 1996; Walker & Lloyd-Walker, 2014). While the number of projects procured under ECI has been increasing in last few decades (Edwards, 2009; Love, O'Donoghue, Davis, & Smith, 2014; Scheepbouwer & Humphries, 2011; Whitehead, 2009), shifting from conventional to relational procurement methods such as ECI still requires deliberate efforts and fundamental changes by clients involved in the projects (Eriksson, Atkin, & Nilsson, 2009; Kumaraswamy, Ling, Rahman, & Phng, 2005). Like other procurement systems, clients should understand why ECI is suitably deployed over other types of procurement systems (Walker & Lloyd-Walker, 2012) to evaluate their individual and organisational capability to ascertain that they are adequately equipped to overcome difficulties associated with adoption of collaborative-based approaches. However, despite the growing use of ECI by public sectors in Australia in past decades, there has been limited research that investigated the characteristics of this delivery system from the public sectors views. The aim of this study is to investigate the challenges and opportunities for clients to implement ECI for their projects. Influenced by the aim of this study, the principal research question is 'how clients in construction perceive the challenges and opportunity associated with adoption of Early Contractor Involvement (ECI)?'. This research question encompasses the dimensions of the fundamental benefits and barriers in utilising ECI and identification of other aspects that are essential to understand the core characteristics of ECI.

This paper is structured as follows: A literature review is presented that describe the concept of ECI. This review is followed by the methodology section, which describes the research process and provides details of data collection technique. This paper highlights the important findings from the study and future research directions.

## Early contractor involvement (ECI)

Traditionally, construction projects are delivered under Design-Bid-Build (DBB), Design and Build (D&B) and Management Contracting or a variation of these building procurement methods. These single stage procurement strategies offer some benefits to the clients, including cost certainty, control over the project outcomes, and ability to demonstrate value for money and accountability for public projects (Love, Davis, Baccarini, Wilson, & Lopez, 2008). However, such strategies cannot obtain the best contributions of the project participants to a successful project due to exclusion of the contractor from the early design and project planning (Edwards, 2009; Mosey, 2009). In order to incorporate innovative solutions, and building constructability into design, collaboration between the client, designer and contractor is required. In response to this need, a number of initiatives to the project delivery and management have been developed that essentially rely on collaboration between project bodies. Early Contractor Involvement (ECI) as one of the collaborative procurement methods, is an initiative that has been developed to engage the contractor early in the project to develop longer term relationships between project participants and to deliver the best value for the client (Song, Mohamed, & AbouRizk, 2009). Under an ECI arrangement, designer and contractor work together in a contractual relationship with the client, to scope and price the project and then to design and construct the project (Rahmani, Maqsood, & Khalfan, 2017). Song et al. (2009) argue that since contractors generally have a higher level of construction expertise, their input in design will have a direct positive impact on the project outcomes including quality of their own planning and construction performance. Professional advice of the contractor in the design process during the early phase of the project improve risk management, time schedule, cost and safety due to the contractor's in-depth knowledge of construction materials, methods and local practices (Rahmani, Khalfan, & Maqsood, 2016b).

In Australia, although ECI is borrowed from the original British version, the approach is genuinely a different procedure, which is not similar to any form of contract used before. The Australian form of

ECI as a hybrid version of the original British version includes two phases with two separate contracts throughout the different stages of project. The first phase, similar to design alliancing, involves the contractor in a collaborative environment where all project participants become responsible for resolving problems during the planning and design phase. In the second phase, a conventional form of contract such as Construct only, Design and Construction and Managing Contractor at risk (Love et al., 2014) is adopted to complete the design and construct the project. Prior to commencement of the first phase, client normally develops a business case as well as some works on preliminary planning and detailed design report. The selection process of the contractor involves several interviews with potential contractors on the basis of non-price, qualification-based dialogues. Upon the appointment of the contractor, an open book reimbursement contract is signed at the rates contained in the contractor's tender including margins and overhead (Rahmani et al., 2017). The contractor alongside with client and designer collaborate to develop the plans, design and risk adjusted price. If the client agrees with the price, the appointed contractor sign the contract for the second phase including detailed design and construction, otherwise the project moves to the market as a construction contract.

### Related research on ECI: Australasia as a focus

ECI contract is first originated from the engineering and construction contract published by the British Institution of Civil Engineering in 1998 and adopted by the British Highways Agency for their infrastructure projects. Adopting from the British version, in Australia ECI was first used by Queensland Mains Roads in 2005 and around the same time ECI was adopted by New Zealand government. Upon the successful outcomes of the ECI, the public projects are increasingly being delivered by ECI contracts such as 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 as examples (Rahmani, Khalfan, & Maqsood, 2014). As a result, a number of studies have been undertaken in this field of research by scholars and professionals in the industry; and a few guidelines and policies have been published by the government agencies.

The earliest studies followed the first adoption of ECI in Australia by the Queensland and South Australia governments (Edwards, 2007, 2009; Swainston, 2006) however, as ECI was used into a wider range of projects, there has been a surge in research interest into ECI projects in recent years. The Table 1 below shows the articles focusing on ECI within Australasian sorted by study purpose.

### Research methodology

Research methodology refers to the various means by which data can be collected and analysed (Collis & Hussey, 2009). The choice of research methodology is guided by the philosophical underpinning of the research problem, the sources from which data is collected, feasibility of the study and other factors such as time, location and ethical issues (Lewis, Saunders, & Thornhill, 2009). Guided

**Table 1.** ECI literature within the Australasian context.

Authors	Purpose of study
(Swainston, 2006); (Edwards, 2007); (Edwards, 2009))	Definition and Conceptualisation
(Love et al., 2014); (Turner & Riding, 2015); (Rahmani et al. 2016a); (Nibbelink, Sutrisna, & Zaman, 2017);	Pros and Cons
(Scheepbouwer & Humphries, 2011)	Transitional issues
(Hastie, Sutrisna, & Egbu, 2017); (Nibbelink et al., 2017)	Knowledge integration
(Rahmani et al., 2017)	Comparison
(Whitehead, 2009); (Rahmani, Khalfan, & Maqsood, 2012); (Turner & Riding, 2015); (Ferme, Zuo, & Rameezdeen, 2018); (Farrell & Sunindijo, 2020);	Implementation and Experiences

by the research aim, this study considers the reality through a position of the social construction of information. This subjectivist point of view of reality as projection of individual imagination encourages a concern for understanding the process through which human beings concretise their relationships to the world (Morgan & Smircich, 1980).

Influenced by the research philosophical position, in order to gain an insight about client's views about challenges and opportunities in adopting ECI, this study adopts a qualitative research approach as the method of inquiries as advocated for the study of the complex nature of the phenomenon when the objective of the research is understanding and describing the phenomena from the participants' perspective (Flick, 2009).

### Data collection

The choice of techniques for collecting data is highly influenced by the strategy adopted for conducting the research. The choice of qualitative approach guided this study to employ semi-structured interviews as the primary data collection technique. This study intended to capture professionals' point of view about ECI. Interviews, therefore, could document research participants' attitudes, feelings, beliefs, experiences and reactions.

The strategy for recruitment of participants for this study was driven by the principles of *purposive sampling* in an effort to involve participants who could contribute to understanding the concepts being explored. Targeted participants were involved in the construction of infrastructures in Australia within the public sector organisations including state government departments. Ideal participants had been involved in the implementation process of ECI and could provide input into their experience in that area. There are six states in Australia with their own state constitutions dividing the state governments into the same divisions of legislature, executive and judiciary as the federal government. Approval to conduct the study within the organisation was sought from the head of each department via email. Three departments in Victoria, Queensland, and South Australia responded to the request and agreed to participate in the research project. Upon receipt of the approval, a list of candidates who had interest in participating in the research study including their contact details was requested. Initially participants were sought through invitational emails sent directly to them or their secretary and additional participants were identified through *snow ball* sampling approach from the other participants referral.

In total, 25 in-depth semi-structured interviews were conducted with experts and key management representatives on three state government organisations. The 25 people who were interviewed all performed senior leadership roles for their department with several decades of experience within their field of practice specialised in the establishment and delivery of collaborative contracts for complex projects and programmes including ECI as well as other conventional procurement strategies. Table 2 provides a summary of the participants' profile.

**Table 2.** Overview of research participants.

Role		Number of participants	
Program Delivery and Operations Manager		2	
Infrastructure Management and Delivery Director		1	
Project Review and Procurement Manager		3	
Construction Team Leader at Delivery and Operations		4	
Principal Engineer/General Manager		3	
Contracting Services Manager		3	
Project Manager/Director		2	
Network Safeguard and Development Manager		1	
Senior Procurement Consultant		3	
Executive Officer		3	
Experience in construction (in years)			
Minimum	Maximum	Mean	Median
8	40	22.20	23

Interviews involved the researcher and participants in detailed discussion of the issues tackled in the research. Each interview took 30–45 min and all interviews were audio recorded and subsequently transcribed to text format files. The analysis process adopted a ‘content analysis’ approach for the identification of common threads that extends throughout an entire interview or set of interviews.

## Empirical findings and discussion

Analysis of this study predominantly follows the content analysis principles and associated with the microanalysis. Microanalysis is an analysis process that lets the data speak for itself and demonstrates that analysis is not a structured, static or rigid process, rather it is a free flowing and creative (Corbin & Strauss, 2008). Since all research participants ( $n = 25$ ) had experience with both traditional and collaborative delivery systems, they were asked to identify the benefits of ECI and barriers in implementing ECI compared to other procurement methods. This question could narrow down the responses into specifically ECI context and excluded the common attributes that ECI may share with other delivery systems.

Eighty eight percent of respondents ( $n = 22$ ) repeatedly stated that there was ambiguity in the definition of ECI and their responses indicated that the term is used to address a procurement method by some people whereas it is used to refer to a contract form by some others and precisely acknowledged the confusion in the adoption of the term in the industry. For example, one of the participants stated that *‘ECI means differently to different people. Unlike many other forms of contracts or many other forms of procurement process, there is no single method that is completely regarded, or universally regarded, as the ECI approach’* Although the ambiguity in its definition cannot be classified as a challenge in implementation of ECI, it indicates inconsistency in the use of ECI within the industry creating challenges for researchers and practitioners to grasp the true characteristics of this method.

Participants’ discussion of challenges in implementing ECI addressed a wide range of factors that clients encounter in implementing an effective ECI process. Demonstrating value for money to the government was identified as one of the barrier. One participant commented that

Our challenge was to insure that [it] was a value for money outcome, that it was going to give us what we expected in terms of scope, and then once we agreed on price, we had to go to the Cabinet to get approval to award the contract.

Although the hard-dollar stage of the model gives the client the ability to justify obtaining value for money to the government to some extent, a general perception that ECI is a softer form of contract raises treasury’s concerns with respect to the value for money. This finding is supported by Rahmani et al. (2016b) and Walker and Harley (2014) that the use of relationship based procurement models are unable to demonstrate the full value of what they have done and hence remain unproved for a number of advisors in government departments.

Unfamiliarity of the client with the process was described as another barrier. One of the respondents mentioned that *‘From having gone through the process I think one of the challenges from the client’s side is that ECI is rarely used for projects so we gain limited experience and lesson learned for the next [ECI] projects’*. Respondents indicated that they had fairly good understanding of both the traditional contracts as well as highly collaborative approaches such as PPP and Alliancing but were unfamiliar with the ECI process where the combination of both is in place. In addition, misunderstanding of key strategic decisions, lack of confidence and knowledge of the delivery team seem to be the impediments for adoption of ECI. These issues were perceived as one of the challenges in the project teams for running and facilitating the ECI process due to lack of adequately trained resources. The result of a study conducted by Love et al. (2014) within the public sector in the Western Australia also show unanimous agreement with this finding in that the lack of experience of clients in using ECI and competent resources influence the public sector’s choice of ECI procurement method.

Remuneration mechanism of ECI was deemed to be problematic which did not cover the actual costs of design and tendering to the contractor for the first stage. Although the level of senior personnel and amount of time invested in the process from the contractor's side is significant, there is no remuneration to the contractor for the ECI service (Laryea & Watermeyer, 2016) and this was seen as one of the challenges in motivating contractors to get engaged in an ECI process.

Change in relationship protocol was described as an issue in transitioning from early stage of collaborating and open book into a traditional environment. What might have been appropriate behaviours and communication protocol in the early stage may no longer appropriate for the second stage. This issue can be attributed to the lack of guidance available to navigate and manage the change in relationship at the transitioning stage (Farrell & Sunindijo, 2020) coupled with the predominant cynical attitude exists in the construction industry (Scheepbouwer & Humphries, 2011).

Cultural barrier was identified as the biggest challenge where the traditional hard dollar mentality was being brought to the ECI front-end by contractors or the clients. As commented by one of the respondents: *'People who grew up in an environment that is adversarial or always has been adversarial, find it difficult to transition into more of a relationship type of environment'*. Generally, absence of trust, prevailed in the culture of construction industry, impedes the development and nurture of collaborative and open book relationship between the client and contractor which requires diligent efforts from both sides to overcome this challenge (Farrell & Sunindijo, 2020).

Misusing the relationship by the contractor to avoid contractual commitments and obligations repeatedly came to the light as it was perceived that this opportunistic advantage seeking behaviour negatively affect the working relationship between the client and contractor. Zhang and Qian (2017) argue that the contractor's opportunism can cause project disputes that lead to time and cost overruns and reduce production efficiency.

Interestingly, it was asserted that the barrier to ECI was a strong leadership on the client side or strong leadership on the contractor's side in which an imbalanced leadership between the two sides means that one side dominates the leadership. According to Cox and Thompson (1997), asymmetrical leadership in a working relationship creates a position of supremacy upon which the other is dependent and use this to gain advantage. Table 3 demonstrates the challenges in adoption of ECI found in this study.

The first column represents the list of challenges identified in this study and the second columns shows the number of respondents described that item (in both percentage and number format).

Amongst identified challenges, it is evident that cultural barrier, demonstrating value for money, change in relationship protocol, and inadequacy of contractor remuneration for early stage engagement, were experienced by the participants in the most of their ECI contracts.

In discussing opportunities of ECI, participants identified a large number of benefits that the use of ECI could offer. Higher certainty in the price and scope was identified as one of the benefits of using ECI as a result of joint risk management with the help of expertise and experience of the contractor. The greater certainty and better understanding of the risks by engaging project participants have positive influence on the working relationship during the delivery phase, enhance trust and reliability and reduce mindreading and inaccurate assumptions between parties (Marinelli & Salopek, 2019; Rahmani et al., 2016a).

**Table 3.** Challenges in adoption of ECI.

Challenges	Frequency
Demonstrating value for money	80% (n = 20)
Unfamiliarity with ECI process	40% (n = 10)
Inadequacy of remuneration	68% (n = 17)
Lack of adequately trained resources	48% (n = 12)
Change in relationship protocol	72% (n = 18)
Cultural barrier	92% (n = 23)
Misusing the relationship by the contractor	56% (n = 14)
Imbalanced leadership	20% (n = 5)

It was indicated that the ECI process created a better opportunity to undertake value engineering resulting least reworks during the delivery stage. The refined solution caused by the constructor over-seeing the design led to a better value outcome (Song et al., 2009).

Defining standards jointly was identified as another benefit of using ECI when standards of the project were not well defined and developed. It was emphasised that the involvement of the same management team in the both design development and delivery phases was a great benefit to develop and refine the standards. One respondent commented that *'the benefit is definitely having similar people involved in the ECI development, the design development phases, what you're doing in D&C delivery. I'm talking about at the senior management top level'*.

Establishing better communication between the client and contractor in the early stage of project was suggested as a significant benefit of ECI to the working relationship. This finding is generally consistent with the view of Rahmani et al. (2016a) that the frequent interaction between client and contractor in an ECI contract results in enhanced communication, better working relationships and reducing risk of opportunism.

Majority of participants ( $n = 22$ ) pointed out that the positive working relationship built during the collaboration phase was the most noticeable benefit that the ECI process offered. The essence of collaboration generated during the first phase remained in the second phase even though the contractual environment changed to the hard-dollar type of contract. This relationship was characterised as being open, honest and collaborative by which mutual trust and understanding prevail in the working relationship between the parties. No secrecy and transparency incorporated in the relationship, generated a no blame environment in which there was little time spent on commercial claims, or disputes, that can be seen often in normal contracting methodology. As explained by a respondent:

The principal is able to go to tender on a hard-money basis with so much less uncertainty in the job than they normally would and so even you engage in what you may refer to as an adversarial-type delivery method, most of the scope for disagreement has been taken away.

Constructability ( $n = 22$ ) and innovation ( $n = 20$ ) are two benefits of ECI that respondents confidently discussed more than other benefits identified earlier. Except for three participants who had a different view on the constructability considerations for the clients, the rest of participants stated that constructability was significantly improved in their ECI projects as a result of all parties working together to develop the design and planning. For those three participants, it was not their concern how the contractor was to build the project. Rather, they focused on the project outcomes ensuring the project objectives were met. One of the statements as an example was *'the way the contractor builds and fabricates the project in terms of constructability, that's where their innovation is. So, it is not what we focus on, instead we focus on saving money'*. However, the rest of participants emphasised the importance of constructability consideration during the project design. Since the client, designers, and the constructors work together in the same office and review all the designs and construction processes in ECI arrangements, the constructability is evaluated and considered. Contractors generally have different insight into the project constrains and hence they can propose a wide range of other solutions if the initial design was not in compliance with the project objectives even though the integrated solutions in the design process may cause a slight deviation from the original design (Song et al., 2009). It was perceived that the constructability enhancement resulting from the contractor's contribution to the design, reduces the risk of undertaking designs in a way that some components of that design would not be able to be built as they are designed. This can, therefore, significantly reduce the waste of design efforts and risk of delay which helps the project to complete more economically. This is described as a result of careful considerations of the safety issues during the design development and a smaller number of claims by the contractor where some small changes in design in the construction stage can make a big change in construction costs or time.



**Table 4.** Opportunities of ECI.

Opportunities	Frequency
Price and scope certainty	76% ( <i>n</i> = 19)
Value engineering	20% ( <i>n</i> = 5)
Development of standard jointly	12% ( <i>n</i> = 3)
Client-contractor communication	60% ( <i>n</i> = 15)
Working relationship	88% ( <i>n</i> = 22)
Constructability	88% ( <i>n</i> = 22)
Innovation	80% ( <i>n</i> = 20)

In defining innovation, it was suggested that innovation was created by a collaborative link between the designers and the constructors and the collaboration institutionalised in an ECI contract allowed the contractor to propose innovative solutions to problems that were different to what normally were done, therefore the ECI, in the contractual sense, was set up to encourage innovation. One of the respondents provided more details about their recently completed project that

In our [name of project], which was a [multi]million-dollar project, we put it out as an ECI. We had two design and construct ECI proponents and both of them came up with very different scenarios to our reference design. Both of their designs were better as opposed to our reference design and cheaper, so then the process was really good in constructability, and the innovation was just fantastic.

ECI provides an opportunity for the contractor and designers, as well as the client to develop innovative solutions that can add value to the project. Ironically, it was suggested that the competition in the second phase of an ECI was the best vehicle for securing innovation because the proponents had to demonstrate innovative solutions to win the job. ECI process requires the client to be 'open to negotiate' about the innovative ideas but at the same time needs to be very clear about their expectations. The importance of a formal innovation process for driving innovation was emphasised by a few respondents:

You do need to have a sort of formal innovation process, rather than just expecting people to sit around and come up with good ideas ... you just have to use a structured approach ... using a variety of different methods of getting people together ... the process of managing those innovations and scoring them and working out which ones are worth pursuing and which ones aren't, linking them all with sustainability and that sort of thing.

Table 4 illustrates the opportunities in adoption of ECI.

The first column represents the list of benefits identified in this study and the second columns shows the number of respondents described that item (in both percentage and number format).

Amongst identified opportunities, enhancement in constructability, improving working relationship, greater certainty in price and scope, and innovation were perceived by respondents as the primary potential opportunities when ECI is being used.

## Conclusion

It is generally accepted that the early acquisition of construction knowledge and experience improve the project time, cost and performance. The development of ECI was based on this premise that the involvement of the main contractor at the early stage of the project can bring significant benefits to all parties engaged in the project.

The growing use of ECI in public project in Australia, triggered this study to explore the challenges and opportunities of adoption of ECI. Since clients have great influence on the project outcomes given that their financial status, characteristics, management competency and construction experience make significant contributions to project success, this paper focused on construction client organisations as the context of this study. This could also be perceived as a limitation of this study as the ECI involves the contractor at the early stage to create an integrated team that includes client, consultant and contractor. Consequently, the results of this study are based on the client

representatives' point of views. Since the contractors and designers are also main components of a construction project's delivery team, there is a need for future research concentrating on contractor and designer organisations.

The findings of this study enrich and extend the field beyond its current intellectual foundations and connect it more closely to the challenges of contemporary project procurement management practice. This article presents the application of ECI in the Australasian context and shows the opportunities and difficulties that state governments would face in adopting ECI as a delivery system.

The empirical findings of this study suggest a number of challenges and opportunities in implementing a successful ECI that public client representatives could envisage through the experience from their past projects delivered under ECI.

The enhancement in constructability, improving working relationship, greater certainty in price and scope, and innovation are shown the major opportunities ECI can provide. In turn, cultural barrier, demonstrating value for money, change in relationship protocol, and inadequacy of contractor remuneration for early stage engagement are reported as the challenges clients experience in utilising ECI.

The use of ECI in the current structure for projects in the future is significantly dependent on the outcomes of more projects once a greater number of ECI schemes have been completed. While the growing maturity of the industry towards ECI would lead the decision-makers select this delivery system with more knowledge, further studies are required to be carried in order to refine, improve and extend the results of this study.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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