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# **Early contractor involvement in Australia: Learnings from Transfield Services projects**

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## **Abstract:**

Early contractor involvement (ECI) commonly refers to the engagement between parties (project owner, designer and solution proponent) during the early stages of a project and involves scoping work, outcomes and stages. Originating in the areas of engineering, construction and project management, the application of ECI has recently been adopted by governments and public companies around the globe in an attempt to achieve better relationships and successful delivery. This paper reviews the key themes evident in the literature examining ECI and then adds an insider's view to provide key insights about the successful application of ECI as experienced by a large Australian operations and maintenance contractor, Transfield Services. This matching of theory with application reveals the potential benefits and challenges that local industry has in applying ECI as a formal, structured approach and suggests ECI has much potential as a viable and interesting concept in the Australian market.

## **Keywords:**

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## INTRODUCTION

Early Contractor Involvement (ECI) first gained traction in the United Kingdom (U.K.) during the early 2000s, arising largely in response to a recognised need in the late 1990s of introducing construction advice early into the procurement process (Mosey, 2009). U.K. Government agencies were the first to take hold of the concept and introduce a formal structure to use constructor advice to benefit a major project in the planning stages (Pollitt, 2002). The application looked to increase the value placed on constructor ability rather than a stand-alone focus on price, with the aim of decreasing overall project costs or blowouts through better facility layout, more functional assets and a better understanding of the time and scope of the project during the construction phase. Early success led to ECI being applied by other government agencies abroad, such as in the United States (U.S.), Netherlands and New Zealand, that had faced similar environments where constructors were hired on price once a project has progressed, diminishing the impact their knowledge could have on improving the project (Eadie & Graham, 2014; Scheepbouwer & Humphries, 2011); (Lenferink, Tillema, & Arts, 2013). Whilst Australia is one of the more recent countries to adopt the concept as a possible approach, examples from Queensland and South Australia have been recorded in peer-reviewed literature (Rahmani, Khalfan, Maqsood, Noor, & Alshabri, 2013; Scheepbouwer & Humphries, 2011) and other examples of ECI-style contracts going to tender and being executed under the structure have been noted by Transfield Services in the water, roads and oil and gas sectors amongst others.

There are various definitions of the concept, with Rahman and Alhassan (2012) perhaps providing the most general guidance with the explanation that “ECI refers to the involvement of a contractor at an early stage of project development, to work with the client and/or consultant, mainly to assist in planning and buildability” (p. 217). What is clearer, is the separate methodology used to apply the model depending on the industry and regional needs and trends. The U.K. uses, as described by Nichols (2007) and cited by Rahman and Alhassan (2012), ECI as a form of partnering early in the process for the purpose of advice and developing a Target Price; Australian organisations use a managing contractor model where one team is responsible for the planning and construction of the project; and the United States apply ECI through provision of pre-construction services to a client at the same time design services are provided under a separate contract (Rahman and Alhassan (2012); Scheepbouwer and Humphries (2011)).

While existing literature is focused more on the use of construction contractors, an understudied area of ECI is the inclusion of other parties, such as project managers, operations, maintenance, engineering and asset management solution proponents (herein service providers). By widening the scope of possible players in an ECI arrangement, it is suggested that a plethora of benefits have the opportunity to be realised further by increasing the likelihood of positive outcomes. These can include minimising risk; achieving a more predictable outcome; cost-effective project delivery; a partnering approach that increases transparency and collaboration; efficiency and market-tested scope design; improving traditional methods to focus on a whole-of-life asset approach, new commercial models; and mutually beneficial procurement model. The paper focuses on asset management service providers and reviews the needs that create an environment that ECI can operate successfully in to bring about the benefits listed above.

There is a clear need to further knowledge about the role of ECI internationally and within the Australian context and to obtain an insider's view. This paper attempts to contribute to filling this gap, with the authors being employees currently active in the industry and with a company providing asset management services. This paper, firstly, presents a review of the key themes evident in the international ECI literature before narrowing the focus to the Australian context. Second, the research setting of Transfield Services and its position within the Australian industry markets of energy, defence, transport and infrastructure is described. The key insights or findings are then outlined and discussed. The concluding section outlines the potential for a best practice ECI approach, practical implications associated with engagement between involved parties and areas for further research.

## REVIEW OF THE ECI LITERATURE

This section outlines the key themes evident from a review of the ECI literature, and the synthesis of this is shown in Table 1.

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**Table 1: Themes and illustrative sources**

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### Origins and context of ECI

- Originated from the engineering and construction contract (Molenaar, Triplett, Porter, DeWitt, & Yakowenko, 2007)
- More recently adopted by government and public companies around the globe (Eadie & Graham, 2014; Lenferink et al., 2013; Rahmani et al., 2013; Scheepbouwer & Humphries, 2011)
- Alliance model sharing pain and gain (Davis & Love, 2011)

### Towards a definition of ECI arrangement

- Engaging a contractor before commencement of the construction work to give input during design (Scheepbouwer & Humphries, 2011)
- Involvement of a contractor at an early stage of project development (Rahman & Alhassan, 2012)
- Can be highly structured form, beginning during the design phase to allow contribution of construction knowledge and experience in design (Song, Mohamed, & AbouRizk, 2009)
- Industry views ECI as a procurement model (Calvert, French, & King, 2010)
- ECI is a hybrid delivery model of traditional and relational delivery methods (Scheepbouwer & Humphries, 2011)

### Usual parties of an ECI arrangement

- The extant international literature is dominated by the areas of engineering, construction and project management (Eadie & Graham, 2014; Lenferink et al., 2013; Rahmani et al., 2013; Scheepbouwer & Humphries, 2011)
- ECI focusing on long-term, high-value work (Scheepbouwer & Humphries, 2011)

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## **ECI as a contracting model**

- Different forms of ECI are evident in different regions (Rahman & Alhassan, 2012; Scheepbouwer & Humphries, 2011)
- A hybrid delivery model of traditional and relational delivery methods with the purpose of capitalising on the benefits of both (Scheepbouwer & Humphries, 2011)
- ECI selects contractors not by lowest price bid but by an assessment of the company's track record via its capability assessment toolkit (Scheepbouwer & Humphries, 2011)
- Formal agreement provides an unprecedented opportunity to develop a partnership based on trust and collaboration with fostering an environment of innovative commercial models to gain further benefit (Eadie & Graham, 2014)

## **ECI and potential benefits associated with large projects**

- The ability to create a partnering relationship that can increase transparency and therefore reduce risk (van Elburg, 2008)
- Efficient designing and planning infrastructure projects in a cost-effective, more efficient and less adversarial structure (Rahmani et al., 2013)
- 30 per cent of total life cycle cost of an asset can be avoided with better decision-making during the design phase (Walker & Jacobsson, 2014)
- Whole-of-life asset management approach relates optimising an asset's lifecycle (Norris, 2013)

## **ECI and challenges associated with projects**

- Competitive tendering and arms-length contract structure can result in adversarial relationships and poor project performance particularly when project complexity, uncertainty and interdependence between the parties is involved (Laan, Voordijk, & Dewulf, 2011)
- Trust is an essential component to a successful project, and is part of the partnership model that ECI's display ((Eriksson & Laan, 2007; Wong, Cheung, Yiu, & Pang, 2008; Zaghoul & Hartman, 2003)

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## ***Origins and context of ECI***

The term ECI appears to first appear in literature in the engineering and construction contract published by England's Institution of Civil Engineering in 1998 (Molenaar et al., 2007), with the intent to add an element of constructability advice into the earlier stages of projects procured with traditional separation of design. The Roads and Highways Agency in the U.K. was an early adopter of the concept in the early 2000s and began to engage contractors based on ability rather than price when a project was in the feasibility planning stage (Molenaar et al., 2007). The application of ECI by the Roads and Highways Agency used a two-step process of qualification-based selection and the use of an open-book target pricing system which involved project savings and losses being distributed to both design and construction parties (Scheepbouwer & Humphries, 2011). This technique derived the benefits of an alliance model by sharing pain and gain (Davis & Love, 2011), as

well as the cost savings focus of a traditional model through the earlier development of trust and collaboration.

Today, ECI has been further adopted by government and public companies around the globe, such as in the U.K., the defense industry in the U.S. (Eadie & Graham, 2014), the transport infrastructure industry in New Zealand (Scheepbouwer & Humphries, 2011) and the infrastructure industry in the Netherlands (Lenferink et al., 2013). Furthermore, a paper by van Elburg (2008) references a similar process to ECI under the term of Early Market Involvement in infrastructure projects in the Netherlands in the mid-2000s. Moving to the Australian context, the first promoted application of ECI was seven years after its conception in the U.K. with literature showing its use by Queensland's Department of Mains Roads in 2005 (Rahmani et al., 2013) and the South Australian Department of Transport, Energy and Infrastructure practicing a two-stage method of ECI around the same time (Scheepbouwer & Humphries, 2011).

### ***Usual parties of an ECI arrangement***

The main players of an ECI arrangement are the client, the designer and service providers. While existing literature refers to a proponent as a "contractor", this paper applies the term "service provider" to acknowledge the various types of parties relevant to ECI. The extant international literature is dominated by the areas of engineering, construction and project management (Eadie & Graham, 2014; Lenferink et al., 2013; Rahmani et al., 2013; Scheepbouwer & Humphries, 2011). An understudied area of ECI is the inclusion of other parties, such as project managers, operations, maintenance, engineering and asset management service providers. Service providers describe contracting organisations that work with companies looking outside their own resources and capabilities to perform set tasks. This usually occurs as a result of a lack of skills, know-how or resources to perform the task and can be in the areas of, but not limited to, operations and maintenance, construction, consulting and design, logistics and facilities management and other specialised tasks. While these examples of outsourced services can occur on both minor and major projects, ECI often focuses on long-term, high-value work (Scheepbouwer & Humphries, 2011). This means the parties are often defined as large companies with the resources, finance and capability to work on major projects.

### ***Towards a definition of ECI***

ECI is broadly defined in terms of the engagement between parties during the early stages of a project (with project being defined as time-limited, regardless of the length of time and scope of work with a desired outcome and stages inclusive of design, engineering, procurement, construction, commissioning, operations and maintenance and decommissioning). The parties are usually identified as the project owner, designer and service provider. For example, in the U.K., Rahman and Alhassan (2012) define ECI as "the involvement of a contractor at an early stage of project development" (p. 217). In the New Zealand context, Scheepbouwer and Humphries (2011) refer to the concept as engaging a contractor "before commencement of the construction work to give input during design" (p. 44).

Earlier definitions are largely based on the involvement of a construction contractor, for instance, Song et al. (2009) describe a highly structured form of ECI as a relationship between the contractor and owner that begins during the design phase and "allows the contractor to contribute its

construction knowledge and experience in design” (p.13). In contrast, industry reports often identify ECI as more of a procurement model (Calvert et al., 2010), while Scheepbouwer and Humphries (2011) propose ECI is a hybrid delivery model of traditional and relational delivery methods with the purpose of capitalising on the benefits of both. Applying these definitions broadly to include both construction and asset management contractors, for the purposes of this paper, ECI is described as an informal engagement of a service provider by the client during the design phase of a project, as well as a formal concept constituting a structured process to derive efficiency and value for money from its application. Adopting this broader view is important as it highlights that other service providers involved in an ECI arrangement can be used to optimise the long-term productivity of assets during the operations phase.

### ***ECI as a contracting model***

Whilst concluding that ECI is most commonly applied to projects “deemed as complex in regard to stakeholder involvement and delivery time frame” (p. 45), Scheepbouwer and Humphries (2011) provide four examples of different models of ECI, giving additional insight into the flexibility of the concept in terms of timing of engagement, amount of proponents, amount of integration between parties and the term of engagement. These four models are discussed by region, a break-down in common with Rahman and Alhassan (2012)’s approach to the concept. Scheepbouwer and Humphries (2011) describe the U.K. model as a two-step process that selects “contractors not by lowest price bid because there is not yet a design to bid for, but by an assessment of the company’s track record via its capability assessment toolkit” (p. 45) and develops an open book target pricing system that becomes the fixed baseline price; Nichols (2007) as cited by Rahman and Alhassan (2012), describes the same model as “a form of partnering with the contractor appointed earlier than usual to help in planning, advise on 'buildability', and jointly develop a Target Price as the basis for a pain/gain share formula in the contract" (p. 217). South Australia is used by Scheepbouwer and Humphries (2011) to describe the Australian model, with the description of two phases: design development, where alliance principles are used and compensation is provided to the service provider through cost reimbursement, and design and construction, where price negotiations begin for the design development and construction stage. This description is similar to Rahman and Alhassan (2012)’s proposition that Australian organisations use a managing contractor model where one team is responsible for the planning and construction of the project. Scheepbouwer and Humphries (2011)’s U.S. discussion notes the model in this region is characterised by the client (in this instance the government) having two separate contracts – one with the designer and one with the construction manager – and that the contract is “procured through competitive negotiations and includes preconstruction services, but may also include construction” (p. 46). Rahman and Alhassan’s description is similar, describing the U.S. application of ECI through provision of preconstruction services to a client at the same time design services are provided under a separate contract. Finally, Scheepbouwer and Humphries (2011) touches on New Zealand where ECI covers “three separable portions” (p. 45), the investigation and research; preparation of design, negotiation of commercial terms and contract duration; and completion of design and physical works.

### ***ECI and potential benefits for large projects***

ECI can be a positive model for de-risking a contract and achieving a more predictable outcome. The benefits that can be derived from an ECI model are diverse. Existing literature on the benefits of ECI

include efficient designing and planning infrastructure projects in a cost-effective, more efficient and less adversarial structure (Rahmani et al., 2013) and the ability to create a partnering relationship that can increase transparency and therefore reduce risk (van Elburg, 2008). Ultimately, these benefits can lead to productivity gains and lower costs. Evidence shows poor asset design increases productivity downtime and that the ability to influence cost decreases as an asset moves along its life cycle. In fact, 30 per cent of total life cycle cost of an asset can be avoided with better decision-making during the design phase (Walker & Jacobsson, 2014). These savings may not be realisable in the design stage; rather ECI's appeal to a client is enabling these better decisions to plan for cost savings in the construction and operation and maintenance stages. Norris (2013) describes this whole-of-life approach to asset management as interacting with an asset to plan, maintain and upgrade parts so that the asset is only replaced or decommissioned once its optimised lifecycle is complete and it is unsafe to keep in production. ECI enables this approach to be used from the beginning, as well as allowing frameworks to be established that govern a productive ongoing interface between client and service provider through the life of the asset.

### ***ECI and challenges with large projects***

By viewing service providers as an avenue in reducing the costs of a project, a client needs to trust the service provider and respect their expertise. Traditionally, a service provider offers skilled resources who are trained to perform tasks within what is mutually deemed a reasonable price with a desired, yet not always delivered, focus on advising better ways of doing things that save money, reduce risk or increase productivity for the benefit of the client. This arrangement, supported by a competitive tendering and arm's length contract structure can result in challenging relationships and low project performance (Laan et al., 2011). An important element of improving this arrangement is trust. Eriksson and Laan (2007) propose that inefficiencies in the construction industry can be construed to varied reasons such as "lack of trust and cooperation between the actors" (p. 388). Wong et al. (2008) suggest that trust and partnering are inter-dependent. Information sharing to develop mutual understanding can lead to trust, and in turn improve a contracting relationship through a partnership approach. Wong, Cheung, Wing Yiu & Yan Pang (2008) further propose partnering projects "achieve better project quality and safety, create new direction of technology usage and make more business" (p. 822). Zaghoul and Hartman (2003) discuss the absence of trust in a business relationship leading to questionable outcomes for a project and an increase of risk. With trust an established component of a successful project, the authors propose that ECI can de-risk a contract by containing partnership and trust components.

## **RESEARCH SETTING - TRANSFIELD SERVICES**

Transfield Services is an Australian-company with 19,000 employees and 200-plus contracts world-wide. Transfield Services has evolved from a 60-plus year pedigree of asset ownership, construction, operations, maintenance and consulting (Cresciani, 2006). The company provides logistics and facilities management; construction; consulting; care and welfare; operations and maintenance; and well servicing across the utilities, telecommunications, transport, defence, property, social, oil and gas and mining sectors. The Company works within a wide range of commercial models which includes having experience in a long-term partnership approach which shares risk and reward (Burdon, Chelliah, & Bhalla, 2009).

## FINDINGS AND DISCUSSION

This section reveals the key insights from the experiences of Transfield Services, as shown in Table 2.

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### Themes and illustrative sources

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#### Usual parties of an ECI arrangement

- ECI is in the early stages of acceptance in Australia (Scheepbouwer & Humphries, 2011)
- Involved parties can be characterised by an early innovator culture (Scheepbouwer & Humphries, 2011)
- Involved parties can have a moderate appetite for risk, operate collaboratively and have a desire to reduce fringe costs (Molenaar et al., 2007)

#### ECI as a model for operations and maintenance contractors

- Shows similarities to the adoption of alliancing as a partnering model, such as the qualities of partnering and integration and the current level of success of applications (Das & Teng, 2001; Holt, Love, & Li, 2000)
- Alliancing involved shared risk and reward contract models, integrated teamwork and the removal of “adversarial” behaviour (Davis & Love, 2011)
- Formal agreement allows for a relationship built on trust and collaboration fostering an environment of innovative commercial models to gain further benefit (Eadie & Graham, 2014)

#### Towards a best practice approach of ECI

- Selecting the lowest bidder can lead to low profit margins and below par project management (Chan, Chan, Lam, & Wong, 2011)
  - More effective to choose a service provider by capability, track record and perhaps an estimate of project cost as an assessment of expertise, rather than cost alone (Scheepbouwer & Humphries, 2011)
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#### *Usual parties of an ECI arrangement*

In its capacity as both as a contracted party and industry actor, Transfield Services has experienced a variety of forms of ECI. These instances have mostly involved state and federal government departments rather than public companies. Furthermore, from Transfield Services’ experience ECI appears to be in the early stages of acceptance in Australia, with both client and service provider parties using the tool characterised by an early innovator culture (Scheepbouwer & Humphries, 2011) and having the capability to use ECI as a differentiator. These companies often have a moderate appetite for risk, operate collaboratively and have a desire to reduce fringe costs (Molenaar et al., 2007).

ECI’s application in Australian industry is variable. Some companies use it ad-hoc, or as a once off. Others, such as the government agencies noted in the papers by Rahmani et al. (2013); (Scheepbouwer & Humphries, 2011) appear to view ECI as a viable tool in their suite of commercial

models. From Transfield Services' experience, ECI appears to mostly be wielded in long-term high-value contracts and is routinely used – or not used – by the same clients. The degree and effectiveness of ECI application is different in most circumstances. While one client may have a defined approach, which they use on all or most of their ECI contracts, ECI is often adapted to suit the circumstances of different parties and in different geographical areas. The implication of this is that the term ECI covers a broad-range of possible structures resulting in not one clear definition of ECI. It could also impact the uptake of the model due to lack of literature, public examples and industry bodies promoting the benefits of the tool.

### ***ECI as a model for operations and maintenance contractors***

Based on Transfield Services' perspective, the evolution of ECI from concept to practical tool in Australia could possibly follow the international acceptance of alliances in the 2000s due to the similarity in key qualities such as partnering and integration and the current level of success of applications (i.e. Das and Teng (2001); Holt et al. (2000)). In Australia, alliances went from a formal approach to collaboration before evolving into a commercial model. The commercial model was marked by shared risk and reward contract models as well as indisputable relationship qualities such as integrated teamwork and the removal of "adversarial" behavior between the alliance partners (Davis & Love, 2011).

Service providers such as Transfield Services that have experience as both the early-engaged contractor and having worked with sites that did not have the benefit of construction or asset management expertise during the design phase, see value for all parties in embracing ECI. The ECI arrangement may be informal or formal; however, a formal agreement provides an unprecedented opportunity to develop a partnership based on trust and collaboration whilst fostering an environment of innovative commercial models to gain further benefit (Eadie & Graham, 2014). Transfield Services views the adoption of ECI as common practice within an organisation as hinging in part on the development of a culture that is open to some risk and operates with a partnering and consultative approach. While some organisational cultures already have the qualities needed to adapt ECI, others would need to look at organisational learning techniques and change management theories to prime selected leaders and influencers to move the organisation to a state of cultural fit. For instance, in the United Kingdom, the Roads and Highway Agency remained a practitioner of ECI ("HA in move to make ECI more competitive," 2008) following its trial, meaning it may have developed an organisational culture favourable to its application and appreciative of the benefits.

### ***Towards a best practice approach of ECI***

Transfield Services is aware of two formal types of ECI that are used in Australian industry – single-source and competitive ECI. Single-source, meaning a sole service provider is engaged by a client and included in the process, works if the circumstances are appropriate and it is structured properly. The client must trust the contractor and a fair engagement process must have occurred. Competitive, meaning that two or more service providers are engaged by a client and included in the process, is a more intricate circumstance. While the client has the ability to assess several different proposals and is less of a risk, it requires more time and money for the assessment phase and limits the transparency and openness of the service providers that mark the positive attributes of successful ECI. Competitive ECI can work well if the service provider has assurance that their Intellectual

Property (IP) is not going to be shared; the client has the resources to input to more than one proponent team maintaining confidentiality of the proponents' concept; and the service provider will be properly compensated for their knowledge, know-how and time. Regardless of the type of ECI used, it is Transfield Services' view that to maximise the chances of success there needs to be genuine incentives for the service provider to lend their best ideas to the scheme.

Cost also needs to be considered as only one factor in a myriad of decisions whilst choosing service provider and solution. Understandably, price is a critical element in commercial negotiations between client and service provider but settling on an appropriate price needs to be balanced with ensuring contractual frameworks govern productive work practices through the life of the contract. Selecting the lowest bidder is posited to being conducive to low profit margins and below par project management (Chan et al., 2011); thus, it is suggested a more effective way of choosing a service provider is by capability, track record and perhaps an estimate of project cost as an assessment of expertise: "ECI selects contractors not by lowest price bid because there is not yet a design to bid for, but by an assessment of the company's track record via its capability assessment toolkit" (Scheepbouwer & Humphries, 2011). This is further supported by the U.K., New Zealand and Australian ECI models described by (Rahman & Alhassan, 2012; Scheepbouwer & Humphries, 2011).

The last criterion is the establishment of an effective interface. For Transfield Services' the most fruitful long-term relationships occur when client procurement teams collaborate with us well before final contract signature. They take the time to thoroughly work through possible scenarios and plan operational interfaces through the entire scope of work and supply chain lifecycle. In reference to these instances, interface can refer to the ongoing interaction between client and service provider in delivering the contracted scope of work. These may include day-to-day activities such as permit issues, work pack releases, safety protocols and management instructions – or higher-level issues such as facility layout. The importance of interface is also highlighted in the relationship between design and construction. The combined impact of fractured interfaces over a long period of time invariably leads to repeated downtime and poor execution. In most cases there is also a domino effect through other phases of work. A client's early decisions can mean this effect is negative or positive.

The process of formal ECI is adaptable to the needs, culture and objectives of the project owner. A simple overview of what Transfield Services sees as best-practice application of ECI (as from the point of view of the contractor with consideration given to the experience-identified needs of the client), and one that describes an optimistic application of ECI in the Australian market, is where the service provider is engaged as a single-source basis and receives monetary recognition of their involvement, regardless if their solution is accepted and a long-term relationship started. Engagement is based on qualification-only criteria and, if deemed necessary to verify the contractor has the necessary knowledge to proceed, limited commercial information. This engagement has a low focus on the cost of the end solution at this stage, with trust and a superior track record of a service provider over possible other service provider selections being most important. The service provider then passes through a series of defined staged gates as the design progresses. Increasing commercial detail is provided until a full target cost is built up and checked by an independent estimator. At any of these gates, the client reserves the right to put the contract back out to market if they are unhappy with the pricing. The advantage of this model is that the service provider is

incentivised to provide best value throughout the process in an environment where the IP is relatively well-protected – meaning, the best ideas are freely exchanged.

For example, in 2013 an Australian water industry client of Transfield Services was keen on the concept of competitive ECI within an alliance structure. This involved running two separate and parallel design and construct proponent teams for a 16-20 week period against a basic design and performance specification. Each team worked independently with open two-way communication channels with the client (meaning all service providers had access to client drivers and project requirements), constraints around the client use of IP of service providers who were not awarded the contract and with incentivisations included during the engagement period. At the end of this process, each team produced an outline design together with a target cost. The end result of situations such as this is generally a well-engineered and cost effective solution where the client can choose the one that best suits, whilst compensating the others.

When properly structured and implemented, ECI allows a service provider to fully understand needs and, therefore, provide a response that meets them. ECI can contribute enhanced teamwork and collaboration; a focus on the whole-of-life cost and lifecycle of an asset; insights into new commercial models that may not have been considered otherwise; market-tested scope definition and design and commissioning considerations; clear and transparent need identification by the owner and understanding by the service provider; industry expertise imbedded into the design and planning phase rather than just using advisors; and informed parties that know the suppliers who can deliver what is needed and how to structure a mutually beneficial procurement model.

The benefit to design considerations can have a long-lasting impact on the costs and productivity of asset management services on a site. An industry example is the layout design of a new road project in the 2000s. When Transfield Services was brought in at the design phase feedback was offered on the operations and maintenance manuals – the information that the designers give the maintenance specialists – influencing the final documents. Part of this feedback was an improvement on the design of the ventilation system that for regulatory and operational necessities needed to be checked as part of a standard shutdown every three months. The original design's barriers made the ventilators difficult to access and would take many hours to access and check, conflicting with the six-hour timeframe of the entire shutdown. Because of service provider experience in the roads industry, this challenge was detected in the planning phase and a more sophisticated design of a hinged barrier, which made the entrances easier to move and reduced access time to less than 20 minutes, was proposed.

A further example demonstrating the risk of design error to usability of an asset or facility is the story of an Australian gas plant more than a decade ago. The plant's two processing units were built so close together that a crane was unable to operate in between them. Any maintenance required both to be completely shut down for safety reasons. If they had been located further apart, so that a crane could drive between them, one could keep operating while one was shut down for maintenance, increasing productivity. Furthermore, a crane four times the size of the ones available on site needed to be hired to perform the work. This simple design error of focusing on short-term design, rather than a long-term asset solution cost the client extended shutdown hours as well as lost production time.

## ***ECI and challenges for operations and maintenance contractors***

Despite the myriad of benefits available to well-applied ECI situations, a common hindrance is a badly structured process that does not allow the client or the service provider to operate in the cravats of trust and collaboration. In Australia, Transfield Services has found – through own and industry experience – when a form of ECI is applied it is not uncommon that three or more service providers are invited to sit around the table and input all of their ideas for free. Not only does this create a barrier to openness and transparency, there are examples of clients that take the best ideas from each service provider to create a scope that is then put out to tender where the cheapest price that meets the required competencies is selected. This acts as a barrier to the sharing of expertise, building trust and partnerships and, importantly, stems the growth of ECI in the Australian market.

On the service provider's side there is a tendency for competitive ECIs to be run poorly, which impacts the quality of suppliers willing to take part in projects run under the model. Badly run ECIs can occur when there are too many proponents (Transfield Services recommends three as the ideal number); the service providers are expected to sit in shared workshops and give away their best IP in front of their competitors; or, there is disproportionate compensation for the effort put in. In Australia, there have been instances of competitive ECIs that have cost in excess of \$500,000 with the compensation figure being \$50,000.

## **CONCLUSION**

This paper presents a review of the literature and provides an insider's view and illustrative examples of the successful application of ECI by a large Australian asset management service provider, Transfield Services, to provide an overview of the state of ECI in Australia. Based on the findings revealed, it appears that a number of key features are applicable to ECI across a wide range of industries and to meet various drivers (such as design improvements for long-term cost and time improvements).

This paper offers an important contribution in connecting the practical as well as limited academic literature to offer learnings into the wider value of ECI with a previously uncovered focus on asset management service providers specifically. It presents the unique application of ECI in the Australian environment and shows the difficulties that local industry has in applying ECI as a formal, structured approach.

Based on our findings and learnings, we recommend seven behaviours and contract characteristics are features of a best practice ECI approach. These include: a service provider who is confident to approach a client with a cost effective solution can also eliminate time and money, though the client must be willing to trust them and the process from the very beginning; pricing models are important, but when balanced with clear frameworks for operational interface, long-term productivity can be greatly enhanced by investing at the start; service providers need to become active advisors rather than remain in the traditional role of a passive price taker; a collaborative approach which encourages teamwork and transparent and open communication is recommended; an equal relationship based on trust, protected IP and shared know-how should be fostered; and a feeling of ownership should be embedded across all partners to encourage greater commitment to performance and quality; incentivisation and risk sharing create benefits for both service provider and client.

Further research is required to advance our understanding of ECI and test the applicability of our findings to other industries and national contexts. Useful future study areas would be the benefits and challenges in engaging an ECI model from a client's perspective, as well as further contributing to the study of ECI from other contracting specialties outside of construction (such as asset management and facilities management).

## REFERENCES

- Burdon, S., Chelliah, J., & Bhalla, A. (2009). Structuring enduring strategic alliances: the case of Shell Australia and Transfield Services. *Journal of Business Strategy*, 30(4), 42-51. doi: doi:10.1108/02756660910972640
- Calvert, T., French, R., & King, P. (2010). *20 Projects \$600m, One Goal - Developing Auckland Rail*. Paper presented at the CORE 2010: Rail, Rejuvenation and Renaissance, Wellington, N.Z. <http://search.informit.com.au/documentSummary;dn=761791378068608;res=IELENG>>
- Chan, D. W. M., Chan, A. P. C., Lam, P. T. I., & Wong, J. M. W. (2011). An empirical survey of the motives and benefits of adopting guaranteed maximum price and target cost contracts in construction. *International Journal of Project Management*, 29(5), 577-590. doi: <http://dx.doi.org/10.1016/j.ijproman.2010.04.002>
- Cresciani, G. (2006). *Transfield: The First Fifty Years*: Australian Broadcasting Corporation.
- Das, T. K., & Teng, B.-S. (2001). Trust, Control, and Risk in Strategic Alliances: An Integrated Framework. *Organization Studies (Walter de Gruyter GmbH & Co. KG.)*, 22(2), 251.
- Davis, P., & Love, P. (2011). Alliance contracting: adding value through relationship development. *Engineering, Construction and Architectural Management*, 18(5), 444-461. doi: doi:10.1108/096999811111165167
- Eadie, R., & Graham, M. (2014). Analysing the advantages of early contractor involvement. *International Journal of Procurement Management*, 7(6), 661 - 676.
- Eriksson, P. E., & Laan, A. (2007). Procurement effects on trust and control in client-contractor relationships. *Engineering, Construction and Architectural Management*, 14(4), 387-399. doi: doi:10.1108/09699980710760694
- HA in move to make ECI more competitive. (2008). *Contract Journal*, 444(6685), 36-36.
- Holt, G. D., Love, P. E. D., & Li, H. (2000). The learning organisation: toward a paradigm for mutually beneficial strategic construction alliances. *International Journal of Project Management*, 18(6), 415-421. doi: [http://dx.doi.org/10.1016/S0263-7863\(99\)00066-6](http://dx.doi.org/10.1016/S0263-7863(99)00066-6)
- Laan, A., Voordijk, H., & Dewulf, G. (2011). Reducing opportunistic behaviour through a project alliance. *International Journal of Managing Projects in Business*, 4(4), 660-679. doi: doi:10.1108/17538371111164065
- Lenferink, S., Tillema, T., & Arts, J. (2013). Towards sustainable infrastructure development through integrated contracts: Experiences with inclusiveness in Dutch infrastructure projects.

- International Journal of Project Management*, 31(4), 615-627. doi: <http://dx.doi.org/10.1016/j.ijproman.2012.09.014>
- Molenaar, K., Triplett, J., Porter, J., DeWitt, S., & Yakowenko, G. (2007). Early Contractor Involvement and Target Pricing in U.S. and UK Highways. *Transportation Research Record: Journal of the Transportation Research Board*, 2040(-1), 3-10. doi: 10.3141/2040-01
- Nichols, M. (2007). Review of Highway Agency's Major Roads Programme. *The Nichols Group, London*.
- Norris, M. (2013). Planning to Extend the Life of Major Assets. *Procedia CIRP*, 11(0), 207-212. doi: <http://dx.doi.org/10.1016/j.procir.2013.07.049>
- Pollitt, M. G. (2002). The declining role of the state in infrastructure investments in the UK. *Private Initiatives in Infrastructure: Priorities, Incentives and Performance*, 67-100.
- Rahman, M., & Alhassan, A. (2012). A contractor's perception on early contractor involvement. *Built Environment Project and Asset Management*, 2(2), 217-233. doi: doi:10.1108/20441241211280855
- Rahmani, F., Khalfan, M. M. A., Maqsood, T., Noor, M. A., & Alshabri, N. (2013). *How can trust facilitate the implementation of Early Contractor Involvement (ECI)?* Paper presented at the CIB World Building Congress Construction and Society, Queensland, Australia.
- Scheepbouwer, E., & Humphries, A. (2011). Transition in Adopting Project Delivery Method with Early Contractor Involvement. *Transportation Research Record: Journal of the Transportation Research Board*, 2228(-1), 44-50. doi: 10.3141/2228-06
- Song, L., Mohamed, Y., & AbouRizk, S. (2009). Early Contractor Involvement in Design and Its Impact on Construction Schedule Performance. *Journal of Management in Engineering*, 25(1), 12-20. doi: doi:10.1061/(ASCE)0742-597X(2009)25:1(12)
- van Elburg, J. C. (2008, 10-12 Nov. 2008). *Market consultation as a tool for early market involvement in infrastructure projects (governance of infrastructure projects)*. Paper presented at the Infrastructure Systems and Services: Building Networks for a Brighter Future (INFRA), 2008 First International Conference on.
- Walker, D., & Jacobsson, M. (2014). A rationale for alliancing within a public-private partnership. *Engineering, Construction and Architectural Management*, 21(6), 648-673. doi: doi:10.1108/ECAM-09-2013-0087
- Wong, W. K., Cheung, S. O., Yiu, T. W., & Pang, H. Y. (2008). A framework for trust in construction contracting. *International Journal of Project Management*, 26(8), 821-829. doi: <http://dx.doi.org/10.1016/j.ijproman.2007.11.004>
- Zaghloul, R., & Hartman, F. (2003). Construction contracts: the cost of mistrust. *International Journal of Project Management*, 21(6), 419-424. doi: [http://dx.doi.org/10.1016/S0263-7863\(02\)00082-0](http://dx.doi.org/10.1016/S0263-7863(02)00082-0)

