Sustainability non-price incentives and rewards: a collaborative procurement perspective

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Abstract

Construction scholars suggest that procurement processes can be used as mechanisms to change construction industry practices. This paper discusses industry changes as a response to the calls for integration of sustainability ideals into construction practices. Because major infrastructure construction has been identified as a key producer of greenhouse gas emissions (GHGE), this study explores collaborative procurement models that have been used to facilitate mitigation of GHGE. The study focuses on the application of non-price incentives and rewards that work together as a binary mechanism. Data were collected using mixed-methods: government document content analysis was complemented with data collected through focus groups and individual interviews with both clients and contractors. This report includes examples of greening procurement agendas for three Australian road authorities relating to collaborative procurement project delivery models. Three collaborative procurement models, Alliance Consortium, Early Contractor Involvement and Public Private Partnerships provide evidence of construction projects that were completed early. It can also be argued that both clients and contractors are rewarded through collaborative project delivery. The incentive of early completion is rewarded with reduction of GHGE. This positive environmental outcome, based on a dual benefit and non-price sustainability criteria, suggests a step towards changed industry practices though the use of green procurement models.

Keywords: sustainability, collaborative procurement, non-price incentives and rewards, GHGE reduction

1. Introduction

Procurement mechanisms are a well-documented method for provision of the global issue of economic reform in the construction sector (Miller et al., 2009; Langford et al., 2003). To achieve this objective, mechanisms such as funding support for development of organisational structures to improve production efficiency have been implemented in a number of countries (Guthrie et al., 2012; Raisbeck et al., 2010). In Australia, especially related to infrastructure, federal and state government departments have the role of change agents in the construction sector. However, in a market economy, with governments as major infrastructure clients, the issue is more complex. Currently most government clients prefer market-based solutions rather than government intervention, expecting non-government organisations to also be pro-active in changing industry practice (Kajander et al., 2012; Varnas et al., 2009; Kenley et al., 2000). For example, regulations and building or material standards are traditional methods in which both public and private organisations take responsibility for implementing construction sector change.

Kenley et al. (2000) suggest that economic reform based on construction sector sustainable practices is a government social responsibility objective. Similarly, Fernando & Guppy (2006) argue that governments must change their procurement practices to ensure social as well as economic accountability. This obviously global shift towards considering the impact of climate change has added environmental sustainability (conserving and enhancing the community resources for future generations) to the list of government social and economic responsibilities in many countries (Kajander et al., 2012; Shi et al., 2012; van Wyke, 2006).

Within the construction sector, progress has been made in the uptake of sustainability as an organizing principle for both public and private organizations. For example, a number of sustainability rating systems have been co-developed and are either locally or globally implemented. CEEQUAL (all infrastructure), INVEST (transport), BREEAM (buildings) and LEED (buildings) are all currently gaining acceptance through all phases of the construction process (Gutherie et al., 2012). However acceptance and implementation of these initiatives is not universal.

Some scholars suggest that the slow pace of industry change may be linked to contractors who have not developed sustainability practices because they seldom move outside of contract specifications (Lam & Yu, 2011). In countries such as Australia where government agencies are the principle client for infrastructure (buildings and transport facilities) the expectation is for government to be change leaders (Kenley et al., 2000). For example, government procurement non-price sustainability contractor incentives and rewards can be used as positive mechanisms to change construction practices (Kenley et al., 2012). This has begun in Australia in order to meet Kyoto Protocol commitments. The Australian government has policy directives for all levels of government responsible for construction to consider ‘greening’ their procurement processes for improved environmental impact (Infrastructure Australia, 2012). The balance of this paper will report on some steps towards “greening procurement” of infrastructure construction for three Australian transport authorities.

The next section provides the background to the study, based on the implementation of the Australian Greenhouse Gas Emission (GHGE) policy agenda. It begins with a discussion of sustainable industry change through collaborative project delivery models. Three models are considered: early contractor involvement (ECI), alliance consortium (AC) and public/private partnership (PPP). These models provide a framework for the application of sustainability incentive and reward mechanisms. Section three outlines the research methods and types of data collected. Analysis and discussion of the concept of greening the major roads procurement process provides examples from three Australian states in section four. Finally, a conclusion based on GHGE reduction and collaborative project delivery models is offered.

2. Greening procurement through collaborative project delivery models

The dominant scientific view of a direct relationship between greenhouse gas emissions (GHGE) and human behaviour related to long-term negative environmental effects has led to increased significance being attached to sustainable industry practices (O'Hara, 2009). This is especially true for the construction sector, a sector that produces a high level of GHGE (Hill, 2001; Hill and Bowen, 1997). The simple equation of reduced infrastructure construction time equals reduced GHGE is one principle associated with changing industry practices. It is expected that client and contractor collaboration throughout the construction phases will reduce both project duration and GHGE. This Australian transport authority sustainability change agenda is a foundation for greening government procurement.

Often in construction literature, procurement models based on collaborative team work is termed 'relationship procurement', however 'relationship' is inter-changeable with 'partnering' or 'alliance' (Walker & Hampson, 2003). However, Akintoye and Main (2007) do mention collaborative procurement as a specific type of relationship procurement. For the purposes of this paper, collaborative procurement has been chosen as a more effective classification of the procurement delivery models presented.

Table 1 Comparison between elements of traditional and collaborative procurement models

Collaborative Procurement	*Traditional Procurement*
Collaboration	*Adversarial*
Problem-solving	*Competition*
Innovation	*Sanctions*
Trust	*Contractual penalties*

Collaborative project delivery models, as opposed to traditional models, enable a client/contractor binary benefit due to key characteristics (Davis, 2007) as indicated in table 1. Trust is the important feature of collaborative procurement. A relationship based on trust means that decisions can be made allowing for innovation and problem solving through working together to refine and re-define project

objectives. It is therefore assumed that contractors working within a collaborative procurement project delivery model are motivated to move beyond initial contract specifications. The outcome sought is for the contracts to align sustainability as a positive feature of client social accountability with contractor business objectives (Broome, 2002).

Through collaborative processes, numerous incentive and reward mechanisms can be built into the procurement process in order to translate policies and strategies into pro-active initiatives. Kenley et al. (2000) provide a list of types of incentives and rewards. Incentives are explained as "commitments to encourage future behaviour" and rewards are "recognition of past performance" (pp5). Both rewards and incentives are aimed at a desired industry-wide attribute of "environmental consciousness" (pp8). Although the authors make a distinction between the meaning of rewards and incentives; this paper will treat these terms as a binary unit as opposed to the commonly accepted practice of treating rewards and incentives as synonyms.

A binary unit means that both rewards and incentives are available to clients as well as providers. This difference is based on the view that greening procurement practices can be created through a collaborative framework to provide positive outcomes for both clients and contractors (Broome, 2002). For example, client defined incentives encourage contractors to develop strategic and innovative environmental and production efficiency attributes. Contractors that gain a good reputation earned by successful project sustainability performance will be rewarded with future projects. As a binary unit, client incentives are reinforced by client rewards based on contractors continuing sustainable practices for all their projects. Therefore, incentives and rewards work together as a binary unit through a collaborative framework, which in turn provides a dual benefit for both clients and providers.

Three project delivery strategies based on collaborative procurement models and non-price mechanisms are becoming industry standard for Australian infrastructure projects: early contractor involvement (ECI), alliance consortium (AC) and public/private partnership (PPP). Contracts for these project delivery strategies involve contractors in the early stages of planning, design and funding. An important non-price feature of ECI, AC and PPP delivery models is their co-operative decision-making processes to achieve the sustainability objective of the project, namely GHGE reduction (Uttam et al., 2012), based on non-price binary mechanisms.

Each of these descriptors (ECI, AC and PPP) have been used in the literatures to describe a project delivery strategy, a client/contractor relationship, a contract or a performance payment system (Rose and Manley, 2012; Gollagher and Young, 2009; Walker and Hampson, 2003). Close examination of each type does provide degrees of complexity, however, for this report each descriptor simply means a procurement model used for the purpose of meeting the obligations for 'greening' procurement related to major roadworks in three Australian states.

3. Research approach

This research is based on the premise that sustainability non-price criteria in procurement can be used as mechanisms to change construction industry practices (Kenley at al., 2000). A binary unit of

rewards and incentives suggests that both clients and providers can benefit from greening procurement initiatives. In the first instance the Australian government Kyoto Protocol greenhouse gas emissions (GHGE) targets linked to greening government infrastructure procurement can reduce GHGE. In the second instance driving construction industry change to facilitate new sustainability practices for social and economic outcomes is the result of adoption of collaborative project delivery models.

Data were collected using mixed-methods (Creswell, 2009). Policy, regulation and contract document analysis for three Australian state transportation authorities formed the basis of approximately 90 per cent of documents available. Related types of documents were obtained for federal government agencies that are part of the transport infrastructure sector. Additional data concerning procurement processes for major roadworks were obtained through focus groups and individual interviews. Input from contractors included personal interviews, seminar materials and searching Australian based organisational Internet websites (Fellows and Liu, 2008).

Synthesis for analysis of the different types of data is based on distilling relevant knowledge from the literatures focused on sustainability, construction management, and government procurement. This report offers a small portion of a larger project to provide some insights related to the importance of the incentive/reward mechanism to ensure implementation of green procurement practices for major roads infrastructure projects in Australia (Kenley et al., 2012).

4. Three Australian major roadworks examples

Scholars agree that the selection of the appropriate project delivery model is the most critical decision in determining the success of a project (Miller et al., 2009). Three examples of collaborative project delivery including indications of successful implementation of a green procurement model are presented below. Together, the projects will demonstrate how non-price incentives and rewards work together as a binary mechanism and are delivered through collaborative procurement models to achieve a dual benefit for clients and providers. By achieving infrastructure project rewards through reduced project duration, clients and contractors achieve their social and economic responsibility by reducing GHGE. In addition non-price incentives assist the greening procurement agenda to affect industry change objectives.

4.1 New South Wales: RMS + AC

The state government of New South Wales requires public organisations to be carbon neutral by 2020. This means Roads and Maritime Services (RMS) must achieve zero net greenhouse gas emissions (GHGE) by 2020. A number of initiatives have been developed by RMS as part of their objective to ‘green’ their procurement processes. For example, RMS is a national leader in the development and implementation of a nationally developed carbon calculator. The TAGG Greenhouse Gas Assessment Workbook for Road Projects & Carbon Gauge (the electronic version) that became available in June 2011. The TAGG Workbook/Carbon Gauge contains quantification methods designed to be compatible with the international Greenhouse Gas Protocol Corporate standard. The TAGG methodology is intended to be a practical tool as well as an instrument of environmental sustainability

education. It provides a method for estimating GHGE as well as providing the opportunity for a better understanding of how GHGE can be reduced (Dilger et al., 2011).

NSW RMS has incorporated Alliance Consortium (AC) delivery approach as part of their 'green' procurement initiative. Collaboration is developed through constituent organisational members from both the public transport authority and private services providers. AC teams form a type of 'virtual' organisation that is outside of everyday workings of their parent organisations which allows flexibility and innovation. Based on the collaborative perspective of AC, the state transport authority as the client aims to share construction risks by co-operating with project providers such as designers and contractors. Scholars have identified the importance of supporting governance structures to promote a truly collaborative "no-fault-no-blame" project culture through clearly defined group decision-making processes with Key Performance Indicator incentives (Miller et al., 2009; Wong et al., 2000). The AC procurement model also targets building roads and effective business relationships based on learning and innovation (Lam and Yu, 2011). Group decision-making to institute innovation and performance measurement are examples of procurement processes based on trust and co-operation that underpins successful project completion (Davis, 2007).

An example of a success story is the Ballina Bypass Alliance set up by the NSW RMS to upgrade 12km of the Pacific Highway. The challenges included seven different treatments to manage soft soils complexity, environmentally sensitive waterways and a high-risk highway as a building site. The $640m highway opened seven months early; attributed to high quality project management. Moreover, successful application of performance incentives in AC projects in a market economy encourages clients and contractors to work together towards a common purpose (Bresnen and Marshall, 2000). The addition of AC to the RMS greening procurement initiative paved the way for construction industry change.

As a government change leader RMS has utilised AC teams working towards the common goal of sustainability. Incentives and rewards for GHGE reduction can become mandatory for infrastructure construction projects. In addition, changing models of procurement to move beyond adversarial construction project relationships within a market economy has the potential to change industry practice. This RMS example indicates how green procurement supports changing industry practice.

4.2 Victoria: VicRoads + PPP

The state of Victoria has one of the most ambitious Australian GHGE reduction targets. The stated aims to reduce greenhouse gas emissions to 30% below 2000 levels, with a target of zero net emissions by 2020. As a change leader, the public road authority, VicRoads, focused on policies and practices to reduce environmental impacts from the road system early in the century <http://www.vicroads.vic.gov.au/Home/Moreinfoandservices/Environment/SustainabilityAndClimateChange.htm>. VicRoads developed one of the first government procurement policies to reduce GHGE focused on both road construction and vehicle use.

In line with these priorities was early implantation of the INVEST tool. INVEST aims to encourage inclusion of innovative ideas that will contribute to improving sustainability in road projects. There

are 11 categories for sustainability for the INVEST tool, each having Key Performance Indicators (KPIs). Credits are awarded based on the KPIs giving a sustainability score and ranking for the project, thereby establishing benchmarks for sustainability practices.

Similarly, VicRoads have developed expertise in Public-Private Partnership (PPP) as a collaborative project delivery strategy. PPP is an agreement between public sector client and a private sector provider. Each party is encouraged to utilise their specific areas of expertise; public authorities for governance and contractors for operations (Langford et al., 2003). The flexibility necessary to solve problems of major infrastructure construction over the long-term is a key advantage for all parties using this project delivery strategy. Issues of sustainability and other non-price elements can be seen as opportunities (Kenly et al., 2012) rather than burdens (Rose and Manley, 2012) during the course of complex infrastructure projects.

The EastLink freeway in Melbourne is an example of the successful use of PPP as a collaborative project delivery model. The Victorian government awarded ConnectEast a 39 year life-cycle concession to finance, design, construct, commission, operate, deliver customer services, toll, maintain, repair and return the road to the state of Victoria. The project is labelled as a 'world-first' for a project of this type using the PPP delivery strategy. The important feature of the life-time service provision is the embedded Key Performance Indicators.

The PPP delivery model aims to eliminate contractual penalties through the successful application of non-price binary mechanisms within Key Performance Indicators (KPSs). The road was built by Thiess and John Holland; construction being completed under-time and with reduced GHGE which definitely meets incentive KPIs for social and economic rewards.

4.3 Western Australia: MRWA + ECI

The state of Western Australia has set a Carbon Reduction Target of 5-15% reduction of 2010 levels by 2020. The road authority, Main Roads Western Australia (MRWA), is moving towards their commitment to this goal through application of a 'greening procurement' policy. MRWA is developing a sustainability framework by integrating a nationally developed sustainability rating tool into their practices. The Infrastructure Sustainability (IS) Rating Tool created by the Infrastructure Sustainability Council of Australia (ISCA) – formerly known as the AGIC – assesses projects and stakeholder practices along the entire supply chain across 15 categories of sustainability. Scores are calculated and provide a rank to establish best practices. MRWA follow sustainability guidelines provided by these rankings to establish non-price criteria that are heavily weighted for sustainability innovation <www.isca.org.au/is/about-is/is-rating-tool>.

Integration of non-price binary mechanisms is also facilitated by a collaborative project delivery model, Early Contractor Involvement (ECI). ECI is predicated upon co-operation and trust, since the understanding that the practical knowledge of experienced contractors can be of benefit to designers of roads at an early stage. For example, their input allows the client to address changes in approvals and land purchase that would otherwise become lengthy, complicated or unachievable in a later construction phase (Cocks et al., 2011; Song et al., 2009). MRWA is a leader in the application of ECI

for major roadworks. The common type of ECI delivery strategy consists of two phases. The first phase involves collaborative procurement through targeted input from the client and greater contractor influence on project direction: sharing the financial risk during the first stage. The second stage can be carried out through more traditional models (D&C or CO) with less risk of variations to the project.

A MRWA example of a successful ECI delivery strategy is the Great Northern Highway Kimberley project (2007-2009). This $116m project was based on a two phase delivery model; ECI plus D&C. Re-defining road alignments based on constructability knowledge of the contractor was the outcome of the first stage of ECI. Project levels of GHGE were reduced because of the road re-alignment. This collaborative project delivery solved a major problem because contractor knowledge concerning requirements for the specific terrain was not in the knowledge domain of their project partners, MRWA (Cocks et al., 2011). The ECI delivery model provided a collaborative relationship based on trust and co-operation (Davis, 2007) as an example of greening procurement objectives. Both public and private partners achieve a binary benefit by meeting their social and economic objectives of GHGE reduction.

5. Conclusion

In a country such as Australia that has specified affirmative action to mitigate the negative effects of climate change, government procurement can be used as an implementation devise. This paper has provided some evidence that collaborative procurement models that include contractor involvement at an earlier stage in major road construction can be linked to GHGE reduction. Three models were considered: AC, PPP and ECI. Each collaborative procurement model provides effective business relationships founded upon group decision-making to facilitate learning and innovation. Co-operation in this way allows for trust and risk sharing as opposed to adversarial relationships, which also provides the flexibility necessary to solve sustainability problems.

The age-old question of whether or not construction industry practices can be changed provided the impetus for this study. The NSW RMS, VicRoads and MRWA examples illustrate industry change. The major factor was project delivery based on collaborative procurement models resulting in reduced greenhouse gas emissions (GHGE) supporting non-price sustainability outcomes to become embedded into industry practice. These three road authorities were also change leaders in the development and implementation of sustainability rating tools and guidelines for Australian infrastructure projects.

The study also explored and identified incentive/reward mechanisms as a binary unit that can be built into the green procurement process. The findings of this study suggest that collaborative procurement is the most obvious framework to facilitate non-price binary mechanisms. Collaborative procurement models enable market-based solutions for both clients and contractors to achieve their social and economic objectives of GHGE reduction. This dual benefit also means that the road authorities are likely to comply with State GHGE targets for 2020 by greening their procurement models. through co-operative project delivery processes that support.

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