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ABSTRACT—This research provides a deeper insight into the performance of alliances for the construction of road, rail and water projects. The principle objective of alliances is to align team member expectations so that they work together for the benefit of the project. To date, this has been a challenge, and as such this makes alliances an innovative approach to procurement of infrastructure. The paper reports on a survey of 18 public infrastructure projects across Australia that used the alliance form of procurement. The results were based on alliance team interviews, which addressed the most critical management issues impacting on the performance of process. The research identified a sample of stakeholders form alliance leadership teams (ALT) and the alliance management teams (AMT) that had recently completed a major infrastructure projects. Results revealed that communication and trust between the ALT and AMT teams was a major issue that impacted on the effectiveness of the alliance. Furthermore, the research identifies several key factors that were necessary preconditions for successful alliances.
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Introduction
Strategic alliances in construction have gained a great deal of attention in Australia in particular. D. Walker and K. Hampson provide a useful history of alliancing from initial oil and gas examples from the literature in the late 1990s to the case study of the National Museum of Australia that they undertook and reported upon in their book [1]. Other doctoral studies on project alliancing in Australia have added to our knowledge of alliances, their strengths and weaknesses, at a deep level [2,3,4]. A recent study on project alliancing was recently published that provides a rich seam of knowledge about the ambience of a project alliance as was well as the mind-set of those involved [5]. This research investigated the performance of 18 alliances in order to critically examine, the effectiveness of the procurement method to deliver successful project outcomes. The result indicated that communication and trust between the ALT and AMT teams was a major issue that impacted on the effectiveness of the alliance. Furthermore, the research identifies several key factors that were necessary preconditions for successful alliances.

The Issues in Project Alliancing
The selection process for alliances is quite different to other forms of project procurement. The partner organization advertises for expressions of interest from a consortium of parties that will form an alliance, usually with the partner organisation. The concept is that the consortium parties first agree to a commercial arrangement of resources commitment and they agree to a pain-sharing and gain-sharing arrangement. They also agree to a relationship agreement to work together in the prescribed alliance format of collegiality in decision-making and undertaking the work and transparency and accountability. Finally, they agree to a no litigation clause for any reason other than malicious behavior.

Each alliance consortium puts forward named individuals that they commit to the project for the project duration and the quality of the bid is judged on the quality of the team put forward. They either allow the probity consultants to determine the ‘reasonable fee’ structure or they set that structure and allow the probity auditors to check their financial records to validate that the fee is not excessive when compared to average profit levels over past years.

This reduces the selection criteria from haggling over the contract price but determining a reasonable return for the input of the expertise of the team to form the leadership and management teams. All other costs, including the project site staffing and ancillary costs plus materials, sub-contracts etc are treated in a similar way to the cost reimbursable arrangements discussed earlier in this chapter. The tender process is rigorous and involves extensive interviews of proponent consortia.

A more detailed account of the selection process can be found in Walker and Hampson and a model for demonstrating value for money has recently been developed from a number of sources including government guides and can be found in the thesis written by C.C. MacDonald [1, 4, 6, 7]

A defining set of attributes emerges from this literature that shows an extension to the partnering concept that appears to get over some of the weaknesses inherent in that approach. These attributes include:
• A contractually structured way to at best overcome or at least minimise potential exploitation of one or more alliance participants by others through a ‘all sink or swim together’ mind-set.
• Closer integration of alliances between the partner organisation and non-owner participants (NOPs) through an alliance organizational structure with a high level alliance leadership team (ALT) comprising the project sponsor/partner organisation and senior champions often board-level individuals from NOP organisations plus an alliance management team (AMT) that has representatives from each NOP. Decision-making is contractually obliged to be by consensus and so while this can be time consuming and energy sapping at times, it results in no party being able to finger point at others for decision failures by the AMT and ALT. This results in a no-blame culture that facilitates the ‘all sink or swim together’ mind-set because failure cannot be laid on any single party.
• A selection process that is predicated upon all participants accepting the alliance principles and charter that is established for each project with contractual force.
• An agreed pain-sharing and gain-sharing commercial agreement that all sign up to. The target out-turn cost (TOC) is agreed by all parties and is referenced to an independently estimated benchmark cost and then developed to factor in innovation. The TOC becomes the baseline that further innovation and efficiencies reduce to release potential gain-sharing. The static nature of the TOC acts as an incentive to ensure that costs do not exceed this value because pain-sharing arrangements on all participants mean that all parties hurt if there is pain. This contractual arrangement strengthens the motivation for collegiality and cooperation.
• The nature of the project alliance agreement reduces power distance so that all parties in the AMT and ALT have an equal voice and their expertise is respected.
• The alliance values are explicit and more specific than a partnering charter.

It is also worth remembering that the alliancing selection processes demands transparency and accountability. alliance NOPs agree to and expect to be audited and subject to probity checks.

The advantage of the alliance approach is that it structures in collaboration, better facilitates innovation and demands transparency and accountability. The collaborative nature of the arrangements means that there is far more flexibility and better coping with uncertainty than with other procurement forms. This is because the partner organisations being locked into the alliance with the NOPs allows priorities to be agreed to be changed, new ideas and innovations to be trialled. It reduces, if not illuminates the energy absorbed in participants engaging in a paper-chase to cover themselves for risk and potential litigation, this is a positive product of the no-litigation agreement which in turn is supported by the consensus agreement of AMT and ALT decisions so that grounds for litigation are undermined by this structure.

This procurement approach does require particular and hard to source skills and attributes of participants and team members. This means that there is a structural impediment to its widespread adoption so even if it became the preferred choice in the near future it would be difficult to roll out globally or even extensively in any one country or region.
Barriers to Success

One of the significant issues with alliances is that they rely on effective project teams that have a commitment to a best for project (BfP) approach. This is perceived to be one of key characteristics of all alliances that drive their success. M.W. Sakal [8] puts forward that since alliances work on the basis of risk and reward, best for project characteristics are a departure from traditional contracting methods because it encourages project participants to work as an integrated team by tying the commercial objectives (i.e. profit) of all the parties to the actual outcome of the project [8].

Sakal builds on this notion by suggesting that alliance decisions should be made on the basis of 'best for project' rather than 'best for individual' [8]. Thereby, marking a shift from traditional adversarial contracting where compensation is tied to the party's performance.

The Department of Treasury and Finance (DTF, 2010) of Victoria states that as participants operate in a peer relationship as part of a joint management structure each participant has an equal say in decisions for the project [6]. DTF defines ‘best for project’ as a principle that is based on the understanding that the participants will direct their decisions toward the collective vision and objectives of the alliance, rather than their own self-interests or the commercial interests of their employer [6].

This sentiment is echoed by a number of authors. K. Manley and coauthors built on this by describing the notion of pain-share/gain-share [9]. They describe it as equitable sharing (in fixed pre-agreed ratios) of the 'pain' or 'gain' depending on how the outcomes compare with pre-agreed targets. Further to this they elaborate that the risk/reward arrangements are designed so that exceptional performance will deliver excellent outcomes for all parties while poor performance will result in poor outcomes for all parties. To which they conclude that the underlying commercial alignment of alliancing is consistent with a 'no blame/best-for-project (BfP) alliance philosophy; that focuses all parties on achieving common objectives, so as to attain a 'win-win' result.

M. Bresnen and N. Marshall believe that it is important to tailor incentives to whatever the project's key performance indicators are, rather than simply to cost [10]. Through their research they found that the attitudes towards pain-share/gain-share arrangements were quite positive and they were seen as being useful in helping reinforce collaboration by providing the opportunity of both clients and contractors to make gains.

Trust is something that does not just happen. S. Rowlinson and Y. Cheung declare that alliance projects reinforce the notion of trust by placing a 'no dispute' clause into the alliance agreement [11]. This therefore, reinforces the fundamental alliance philosophy that decision-making is focused on the project outcome and 'best for project'. Further to which Rowlinson and Cheung argue that developing a formal dispute resolution model in the alliance project might put pressure on the alliance parties, decreasing the incentive to work toward 'best for project', opposing the philosophy of alliancing [11]. Thereby reiterating the fact that alliancing is based on a totally different legal platform than that of traditional contracting or business as usual (BAU) approach. This existence of BfP is therefore critical in determine the success of the alliance, and can be compared with more
traditional business as usual (BAU) approach. The next section discusses the research questions and methodology used to analyse the case studies.

Research Methodology
The major objective of this research is to examine the extent to which the alliance teams work collaboratively to drive a positive project outcome. Past research has shown that the capacity of the project team to adopt a best-for-project (BfP) approach compared to a business-as-usual (BAU) approach is an essential ingredient to successful alliance procurement.

The data collected used structured interviews of 18 alliance projects or cases. The project used a structured telephone survey technique to gather data on each of the cases. All projects had recently been completed in the previous year, and respondents were asked to provide actual data from the project, or reflect on their experience.

Participants for the survey were drawn largely from the membership of Alliance Association of Australia (AAA) and the chief executive officer of AAA provided introductions to the contacts. An e-mail was sent to all potential participants, outlining the research approach, and attaching a plain language statement (PLS), consent form, and the list of questions. All participation in the survey was voluntary. All responses were confidential to the interviewer, and no participant can be identified by his or her response. From a total target pool of 58 projects, responses were received from 14 persons representing 18 alliance projects.

Given that each project was unique, the research methodology adopts the comparative case-based approach, and as such draws out issues and themes informed by the findings of cases included in the study. The next section presents the results of the 18 cases, including the sentiments expressed by each of the respondents on the performance of the alliance projects.

Results
All projects were large and complex public infrastructure projects, including freeways, water treatment plants, major bridge upgrades, and railways. Project values ranged from AU$17 M to over AU$600 M (US$1.00 = AUD$0.97 approx). The interview included a series of 25 structured questions, which were segmented into two broad areas; alliance delivery performance and commitment to best for project.

Alliance Performance
The first area reviewed the alliance performance and in particular sought to identify the differences between planned and actual time and cost overrun. In addition, the respondents were encouraged to provide quantitative responses that allowed for contextualising detail where necessary.

Target Outturn Cost (TOC) Performance
The results show that projects ranged from -11% (i.e., Under) the target outturn cost (TOC) to 128% above. The results showed that 10 (of 18) were over budget, but interesting only four exceed the TOC by more than 10% (see table 1). The stakeholders from of these projects were probed to determine what occurred which may explain the over-expenditure. Table 1 shows that unsurprisingly the most popular a response was increases to scope (Scope change +).
Table 1—Initial Target Outturn Cost (TOC) Compared to Final TOC for Projects Over Budget

In instances where the final TOC came in under the initial TOC, the primary reason for this was as a result of innovation (identified through the construction phase) or as a result of accelerated processes. Other reasons included favourable weather conditions and having good quality assurance processes in place.

In those instances where the project came in over the initial TOC, the primary reason cited was as a result of (client directed) scope increase. Respondents noted that results associated with comparing initial TOC with final TOC did not necessarily tell the whole picture, and those projects with significant TOC overruns, also performed very well against the other performance indicators, like occupational health and safety performance.

### Time Performance

The results showed that when all of the 18 projects were considered, the time performance ranged from -6% (ahead of time) to 14% (overtime). While, 5 (of 18) were over time (see table 2); only one exceeded the planned duration by more than 10%. This data represents the percentage difference between the planned project duration and the final duration.
The research shows that despite some increase in scope the projects were not excessively overtime. Respondents noted that approximately one third of the alliance projects came in under time, and one third came in over time (see table 2). The remaining third were on time.

The project participants were then asked to explain the major reason for the time overrun. In a similar way to the cost performance mentioned above, the principal reason for the time overrun was positive scope change, in other words, increases to the project scope. It also should be noted that in some instances where projects exceeded the estimated duration, this was not necessarily considered a failure, but rather a result of scope change that resulted in an improved final product.

In the instances where projects came in under time, innovation (including accelerated processes) and methodological change were cited as the contributing factors. The alliance methodology was considered by all respondents to be a process that has sufficient flexibility to address changes in scope in a positive manner. Additionally, because of the requirement that major decisions made by the ALT and AMT members are unanimous, that leads to project team participants having a no-blame mind-set, this improves the operational flexibility. The project team has confidence in proposing and enacting innovation and to rapidly re-align deliverable priorities when required in response to threats or opportunities. Thus, benefits derived from scope changes or deliverable re-prioritisation can be greater than would occur in more rigid contractual forms of procurement.

**Benefit to Client**

This section of the paper looks at critical factors that influence success of alliances, and reports how this innovative relational contract seeks to address the inherent problems of traditional contracting methods in an industry that is resistant to change. The alliance in this research included contractors who would normally be considered as competitors, but have joined together as each can supply specialist services for the project. This implies that the project participants collaborate and should resist the adoption a business as usual (BAU) approach.
Respondents were asked to gauge the performance of the alliance management team (AMT) against several indicators, including business as usual (BAU), and best for project (BfP). The results (see figure 1) of the survey showed that 16 (of 18) respondents agreed that project participants exceeded the BAU attitude.

Past research has shown that a critical factor for success in alliances is the ability to collaborate as teams, in particular to adopt a best for project (BfP) approach. The second area of this research asked respondents to rate the performance of the AMT on a Likert scale from 1 (strongly disagree)
to 5 (strongly agree). Additional contextualizing detail for each question was encouraged, but not mandatory. The results (see figure 2) show that the 15 (of 18) participants agreed that project management team adopted the BfP attitude.

Past research in the area suggested that alliance decisions should be made on the basis of 'best for project' rather than 'best for individual' [8, 12, 13]. This is designed to shift the project team from traditional adversarial contracting where compensation is tied to the party's performance to one that encourages collaboration and innovation. The results (see figure 2) show that most responded agree that team members adopted a BfP approach.

![Bar chart showing responses to Q16](image)

**Figure 3—Alliance Leadership Team Supports the Role of the Alliance Management Team (Q16)**

There is a strong sense that the AMT is committed to performing above business as usual (BAU) with the majority of respondents rating this statement very high in the scale (Question 13). Similarly, respondents also considered that the AMT acted according to best for project (BfP) (Question 14). The final question related to the support that the AMT from the ALT (see figure 3). This question (question 16) was a proxy of the trust that existed between the two management groups within the alliance. Results indicate a high level of trust, 15 (or 18) projects respondents indicating that support was strong.

The next section discusses the more troubled case studies, including the impact of team attitude and trust in creating successful alliances. Finally, the paper makes some general remarks about the future of alliancing for the delivery of infrastructure projects.

**Discussion**

It may also be important to note that all respondents considered that their projects were a success. While the authors acknowledge that it may be difficult to be precise about what constitutes good or poor performance in construction. It is clear that most of the projects in this research did meet their cost and time expectations, and on the limited basis were considered successful.
It is very obvious from the data shown above, that only a minority of alliance projects in the survey did not meet time and cost expectations. It also seems clear from the survey that participants believe that project participants display the necessary trust and “best for project” attitudes that is a precondition to successful alliances. This outcome supports other similar research by AAA, which showed that all but 5 (of 30) alliance projects surveyed met time and cost targets [14].

This next section of the paper looks to investigate the most problematic projects in the research data, in order to examine how the attitudes and behaviours impacted on the measurable outcomes.

If cost performance is considered (see table 1), three of the worst performing projects all had increases in scope; which according to the respondents increased the final cost. And when time performance is considered (table 2) three (of 5) of the projects overtime had scope increases also.

One of the road and bridge projects (ID #16) had a 128% increase in TOC but was competed in only 6% over the planned time duration. The respondent for that case reported very strong support for a commitment for BfP (see table 3). The project team exceeded a BAU approach, and displayed high levels of support for the AMT. The project included the delivery of a bus way, which needed high levels of community consultation. The project responded reported that extensive interviewing of stakeholder groups was successful in delivering a good support for the infrastructure delivery process.

The flexibilty of an alliance allows project participants to change the scope late in the procurement process, but it also implies that the team become innovative to achieve the project’s key results. In particular, it relies on the ability of the alliance leadership team (ALT) to work cooperatively with the alliance management team (AMT). Research by P. Love, D. Mistry and P. Davis states that the development of a leadership enriched culture, "where people view the project as an extension of themselves and feel good about what they personally achieve through cooperation" was deemed necessary for the successful implementation of a price competitive alliance [15]. One other respondent commented:

“The AMT was extremely focussed as a group on the project ... and continually challenged each other on how to achieve extraordinary outcomes by use of synergy and innovation.”

In contrast, one of the water projects (ID #4) had a 28% increase in TOC and was competed in 14% more time than planned, while the project team exceeded a BAU approach, and displayed high levels of support for the AMT. The respondent for this case reported little support for a commitment for BfP (3 of 5).

A closer examination of this project indicated that the teams did not perform as well as may have been expected. The respondent for the ID#4 project stated that; “Because of the competitive alliance process, the AMT tended at times to revert to a D&C mentality”. This presumably meant that at certain times the team were motivated more by self-interest, than what may have been considered ‘best for project.”
This case in particular highlights that preconditions necessary for a successful alliance. Project alliancing is generally suitable for the delivery of projects with certain characteristics, such as; high-risk, tight timeframe, complex stakeholder issues and complex external environments [16]. Theoretically, alliancing is a promising delivery method in those situations, but there is no guarantees that it will lead to optimum outcomes in practice [16]. Instead, J. Ross suggests that some alliances are being undertaken by clients, and to lesser extent contractors, without sufficient commitment to underlying principles [17]. In some cases, this may result in projects lacking the attitudes and leadership skills needed to establish and sustain a high performing alliance. At best this may lead to sub-optimal alliances, at worst a breakdown in corporate relationships and serious project failures and could damage the plausibility of the alliance model.

**Conclusion**

To summarize the underpinning theory and literature that has informed this research, argues that Alliancing represent a heightened level of project management where the project partners engages fully as a project leadership team and management in order to take on more demanding projects.

Relationship-based procurement, and alliances in particular, is based on: collaboration through joint problem framing and solving; a model of success is wider than time/cost/fitness for purpose; and the driver for alliances being based on best-for-project needs and means. The tangible outcome of the project is the delivery of the expected benefit, a functioning hospital, transportation infrastructure, water supply, or sewerage system. The intangible behavioral outcome of the alliance is demonstrated mutual respect, collaborative process and action and trust and commitment. The implications of this are that:

- If collaboration is the first order determinant of value then trust, commitment, authentic ethical behaviour and ability to achieve complementarities must be valued, appreciated and nurtured.
- This requires authentic leadership behaviours that conform to cultural norms of what all parties perceive to be ethical from their perspective.
- This requires energy being transferred to governance based solely on the ‘iron triangle’ (time, cost, fit-for purpose) to a governance framework that is based upon cultural-behavioural alignment of shared norms. This means that those leading alliances must possess a different mix of a leadership skill set than those engaged in BAU projects. And,
- Organizations need to consider the strategic impact upon their organisations from their key staff being engaged in alliances in terms of strategy re-alignment as well as opportunities and threats that this exposure presents.

Finally, this research has investigated the performance of 18 alliances in order to critically examine, the effectiveness of the procurement method to deliver successful project outcomes. The results of the cases investigated show that the vast majority performed very well. The alliance teams seemed to adopt the required attitudes and behaviors, and also met time and cast targets. Overall, the alliance method of procurement seems to have exerted a positive influence on the projects in this study.

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Nevertheless, each of the projects were unique and presented different challenges to the team members. When a few of the more troublesome projects were investigated it became clear that the team culture was critical to its success. The intangible behavioural outcomes can lead to learning about how to work in this way on future projects so that behavioural learning becomes an important alliance outcome.
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