

PROJECT ALLIANCING: THE CASE OF ROAD INFRASTRUCTURE PROJECTS IN NEW ZEALAND

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In recent years, alliance contracting has emerged as a popular procurement route for large complex infrastructure developments in many countries. As part of a wider study to understand the extent of alliance contracting in the New Zealand construction industry, the basic features of an alliance, the alliance development process, the risk/reward compensation framework, and the governance structure of the alliance are discussed based on three case studies. Representatives from each case were interviewed and relevant documents were referenced as part of the data collection. The analysis revealed differences in the reasoning why a particular alliance approach was implemented, how the alliance selection process was conducted and what kind of structure was adopted for the governance of the alliances. Interestingly, a number of unique and innovative practices to alliancing were also highlighted, such as the construction phase starting during the interim project alliance agreement (iPAA) phase, alliance partners being chosen extremely early in the process and working as part of an interim alliance from the option development phase and, finally, the alliance manager not being from one of the consortium members but is instead an independent. The findings provide a basis and platform for discussion, especially for academics and practitioners, to gain more understanding in managing different alliance contracting projects in the construction industry.

Keywords: case study, project alliance, infrastructure, New Zealand.

INTRODUCTION

Issues associated with the fragmentation of the traditional contracting approach, in the construction industries of both developed and developing countries, have led to recommendations to move towards a more collaborative and integrated delivery methodology (Egan, 2002). In response, a collaborative procurement approach, notably alliancing contracting, has been introduced to ensure the integration practice in delivering construction projects (Sakal, 2005; Walker and Lloyd-Walker, 2015).

An Alliance is a collaborative way of working, typically on large complex projects, that involves the integration of diverse organisations to overcome the project challenges. The alliancing method has been widely used in different continents, across different sectors and in different types of organizations (e.g. Chen *et al.*, 2012; Walker and Lloyd-Walker, 2016). Particularly in New Zealand, more collaborative approaches to construction procurement designed to achieve significant improvements in performance are now

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gathering pace in the industry (Ibrahim *et al.*, 2015). The emergence of project alliances over a decade ago has contributed to its significant establishment, specifically in infrastructure road development. Since then, thirteen road infrastructure projects, estimated at approximately \$4 billion have been successfully delivered or are being delivered as alliances (Ibrahim *et al.*, 2015).

The significant growth of alliances in New Zealand clearly represents a breakthrough in the development of alliancing and, hence, the exploration of its implementation is timely. Although many countries, for example Australia, are quite advanced in project alliancing procurement approaches, it remains a growing area for research in the New Zealand context. Similar to Australia, the New Zealand alliancing experience has also made a significant contribution to the body of alliance knowledge (Walker *et al.*, 2015). With the exception of a limited number of studies, particularly in Australia and a few other countries (e.g. Hauck *et al.*, 2004; Laan *et al.*, 2011; Jefferies *et al.*, 2014), the examination of practical evidence based on real-life project alliances remains elusive. Hence, the objective of this paper is to report on three real-life case studies of highway infrastructure projects procured under the alliance model. Owner and Non Owner Participant's (NOPs) representatives from different organisations were interviewed and relevant documentation for the cases was reviewed. Most importantly, essential features of alliances from these comparative case studies in relation to any similarities and differences are presented and discussed herein.

PREVIOUS CASE STUDIES ON PROJECT ALLIANCING

The increasing attention placed on the project alliancing approach due to its successful implementation (for example, see Walker and Lloyd-Walker, 2016) has led to a number of case studies by academic researchers in this subject. For instance, the ACA (1999) reported how the first alliance project in Australia, the Wandoo B Offshore Oil Platform project, adopted collaborative contracting together with an alliance culture to achieve outstanding success. In another study Walker *et al.* (2002) reported on a case study of the National Museum of Australia constructed under the project alliance delivery approach, and highlighted differences between project partnering and project alliance that occur in the selection process, management structure and the risk and rewards mechanism. Walker and Keniger (2002) discussed the quality management system adopted on the same project in the context of integration of selection criteria and performance measures, and how these can deliver best for project outcomes. Hauck *et al.* (2004) also studied the same building to determine the extent to which project alliancing incorporated collaborative processes and concluded that project alliances for commercial buildings offer many advantages, especially in terms of the levels of collaboration among the project team when compared to traditional project delivery systems. In another study, Lingard *et al.* (2007) evaluated the impact of the compressed work week upon employees through work life balance in a case study of a dam project in Australia. It was found that the project alliance provided an ideal environment in which a good work life balance can help to create high performance work. In addition, Rowlinson and Cheung (2005) identified the critical success factors; trust, teamwork and collaboration as crucial drivers for successful alliance projects based on a case study of a wastewater treatment plant project in Australia. Finally, Jefferies *et al.* (2014) classified the project success factors (e.g. an integrated alliance office, project specific KPI's) based on water services project in Australia.

In addition to the above case studies in Australia, there were also attempts at studying project alliancing based on the case study approach in other countries. For example, in

the UK, Bresnen and Marshall (2000) focussed on an oil and gas project delivered under an alliance to explore the economic, organizational and technological factors that encourage or inhibit collaboration in practice. In another study, Laan *et al.* (2011) provided an insight into the establishment and maintenance of cooperative, trusting relationships under an alliance in a railroad project in the Netherlands. Vilasini *et al.* (2014) established a framework to streamline improvements in processes in a viaduct replacement in New Zealand. Finally, Plantinga and Dorée (2016) investigated the reasoning behind the development of the ‘project alliancing’ delivery system on rail infrastructure in the Netherlands. They indicated that the results (i.e. reasoning during the development processes based on a typology of the shared domain) in their study could help practitioners to reflect upon their motives and logic especially on the shared and pain/gain structures.

Based on previous studies, summarised in Table 1, it is clear that project alliancing studies from Australia are more prominent in the literature, compared to other countries. In terms of the themes of the research, the majority of the studies are focused on a wide range of topics from the concepts and principles, through to the implication of project alliances, with less focus on the features and structure of project alliances. In contrast, a recent study conducted by Walker and Lloyd-Walker (2016) set out to learn about the rationale for choosing an alliance through the involvement of experts from several countries. In addition, although there are established guidelines on the features and structure of project alliances available for reference (e.g. Ross, 2003), they are considered only as a basic guideline, as modifications on the agreement, features and structure of a specific procurement approach are expected to accommodate the challenges and complexity in managing the construction projects.

Table 1: Summary of Previous Project Alliance Case Studies

Authors	Focus	Country	Cases
ACA (1999)	Relationship contracting	Australia	Oil and Gas
Bresnen and Marshall (2000)	Building partnership	UK	Oil and Gas
Walker and Keniger (2002)	Quality management system	Australia	Museum
Walker <i>et al.</i> (2002)	Difference between project partnering and alliance	Australia	Museum
Hauck <i>et al.</i> (2004)	Collaborative process	Australia	Museum
Rowlinson and Cheung (2005)	Critical success factors	Australia	Wastewater treatment plant
Lingard <i>et al.</i> (2007)	Safety	Australia	Dam
Laan <i>et al.</i> (2011)	Relationship behaviour	Netherlands	Railroad
Jefferies <i>et al.</i> (2014)	Identifying critical success factors	Australia	Sewage infrastructure stations
Vilasini <i>et al.</i> (2014)	Framework for process improvement	New Zealand	Road Infrastructure
Plantinga and Dorée (2016)	Analysing the range of applications of the concept of project alliancing	Netherlands	Rail infrastructure

Given the increased popularity of alliance contracting in the development of large complex infrastructure projects, especially in New Zealand where they resulted in considerable cost and time savings (Ibrahim *et al.*, 2015), an exploration of its implementation is timely to see if there are any significant learnings to be taken from their continuing evolution. Consequently, this study intends to add to the above growing literature on project alliancing by reporting the findings of a research project designed to explore the use of project alliancing in New Zealand.

RESEARCH METHODOLOGY

In this study, a comparative case study was selected as the most appropriate way to achieve the objectives of the research. It was also seen as the best way of capturing a wide range of views and opinions of respondents selected from an industry that is project driven and made up of many types of organizations and businesses (Yin, 2003).

Project alliancing in New Zealand was examined as the unit of analysis. The case study projects were identified in collaboration with the New Zealand Transport Agency (NZTA), who have been instrumental in promoting alliancing contracting in the New Zealand construction industry. Three case studies, referred to as Case 1, 2 and 3, are highway infrastructure projects that were currently being undertaken or were recently completed under an alliancing procurement approach at the time of this study. The cases selected are not individually identified, for confidentiality reasons, although the characteristics of the projects are described in Table 2.

Table 2: Characteristics of the selected case studies

	Case 1	Case 2	Case 3
Approx. Target Outturn Cost (NZD)	150 million	340 million	630 million
Brief description of project	Earthworks, Expressway and Bridges	Motorway, Urban Tunnel	Motorway, Bridges and Tunnel
Type of Alliance	Competitive	Pure	Pure
Numbers of NOPs	Two	Five	Six
Location	Hamilton	Auckland	Wellington
Phases during the study was conducted	Construction	Completed	Planning

DATA COLLECTION

The main method of data collection was via semi-structured interviews. Questions focussed on the reasons for adopting an alliance procurement approach, as well as the processes and features embedded within the alliance. Examples of questions asked included; what were the main reasons of adopting the alliance approach? What kind of governance structure has been adopted in the alliance? How does the limb 3 pain/gain arrangement work in the alliance? Accordingly, the views of different stakeholders, including owner and each NOPs representative were sought. In this case, 16 representatives including owner, consultant and main contractor across the three cases were selected for interview (on average, 5 interviews were conducted per case). The interviewees within each case were selected according to the importance of their role in managing the project (ranging from Project Alliance Board (PAB), Alliance Management Team (AMT) and Wider Alliance Team (WAT)) and their experience and knowledge in project alliancing. The interview session with each interviewee was conducted at the project site office and lasted for about one to two hours.

In addition to the interviews, secondary sources of evidence were examined in order to verify the interviewee's statements. They provided relevant documents including the project's scope of work, in-house guidelines for implementing the alliance approach and relevant project reports. The documents were examined before, during and following the interviews. Secondary sources of evidence were used to support the primary source and minimise bias in data collection during interviews.

DISCUSSION

Four key features were identified from the case studies to form the basis of the presentation and discussion of the data, as shown in Table 3.

Table 3: Summary of the four key features

Key features	Case 1	Case 2	Case 3
Motivation behind choosing an alliance	Lack of Designation and Consent, Need for Speedy Delivery	Project Complexity, Need for Speedy Delivery	Lack of Designation and consent, Need for Speedy Delivery, Complex Stakeholder issues, Environmental Issues
Alliance development process	Typical Competitive Alliance selection process	Standard Pure Alliance selection process Construction works started earlier, before the PAA was signed	Adopting 'early contractor involvement' Formation of alliance team prior to concept design
Risk/Reward	Social	Safety	Responsiveness
Compensation	Environmental	Environmental	Consent Conditions
Framework	Economic	Stakeholder Relationships Quality Time Budget Supply chain engagement	Quality of Engagement with Key Stakeholders Alliance Health
Alliance Governance	Standard three levels of governance (PAB – AMT –WAT)	New level of governance was introduced - Wider Leadership Team (WLT) – in addition to standard levels.	Local council part of Alliance and has a seat in PAB Alliance Manager is an independent member

MOTIVATION BEHIND CHOOSING AN ALLIANCE

It is evident that there are significant differences between these three cases in terms of why the alliancing approach was implemented, how the alliance selection process was conducted and what kind of structure was adopted for the governance of alliances. In terms of the reasons for choosing an alliance model, it can be seen that the lack of designation and consent for necessary approval is one of the main reasons. For example, in Case 1 the Alliance Manager stated "They (the owner) had so many problems to deal

with. They didn't have a designation, they didn't own the land and there were a lot of uncertain things". In Case 3, the Alliance Approval Manager described "having the alliance team deal with planning and approval and to get it confirmed as early as possible was one of the main reasons for adopting the alliance". In addition, project complexity, need for speedy delivery and complex stakeholder issues due to high intensity of population, traffic and cultural heritage areas were also recognised. Finally, environmental issues were also cited where the project traverses areas of high-value ecological habitats. As explained by Walker and Lloyd-Walker (2016), internal (e.g. Best value, relational) and external (e.g. risk, competitive resources) pressures are known to be determinants that resembles an alliance.

ALLIANCE DEVELOPMENT PROCESS

As for the alliance development process, it can be seen that across these three cases, two have been developed under a pure alliance and one under a competitive alliance. The findings indicate that, in general, there are no significant differences between how the pure and competitive alliance are implemented apart from the obvious - having one proponent in a pure alliance, compared to two proponents in a competitive alliance competing in the interim Project Alliance Agreement (iPAA) phase to determine the target outturn cost (TOC) of the project. However, interesting deviations from the norm were found in Case 2 and Case 3. In Case 2, it was found that the construction works started early, before the Project Alliance Agreement (PAA) was signed, due to the urgency to start the work because of the constraint of time and characteristics of the location (e.g. Surrounded by high intensity development). According to the Alliance Manager in Case 2 "the alliance team also advanced physical works at the same time as working up the TOC, whereas in normal alliance practice the construction phase doesn't start until the TOC is agreed". Thus, due to advancement of work while still finalising the TOC, an early works agreement (EWA) was established as part of the payment and insurance scheme. The Design Manager in Case 2 explained that "construction started during iPAA through effectively an early works agreement (EWA) which is a vehicle for payment and insurance. Everything done in early works got transferred over to the PAA". Typically, in a project alliance, the construction phase starts after the PAA is signed and all the necessary design and technical investigations have been completed, as seen practiced in Case 1.

In Case 3 the 'early contractor involvement' concept was taken to a new level of alliancing practice. The project alliance was formed prior to concept design, prior to Resource Management Act (RMA) public consultation and prior to approval made by the Environmental Protection Authority (EPA). This decision was taken by the owner (i.e. NZTA) in order to resolve the difficulties due to anticipated stakeholder opposition to the proposed expressway. There was consistent feedback from the interviewees that the need to manage the critically important relationships with local council and community in order to reconcile a complex set of values and issues including cultural environmental impacts and impacts on Māori-owned land led to the early establishment of the alliance. The Alliance Approval Manager and Design Manager in Case 3 argued: "[...] there were challenging issues particularly around the community and political issues [...] it definitely helped, giving the community certainty and client certainty to be able to move quickly in this public engagement phase". The Construction Manager in Case 3 also explained: "[...] it will bring us the advantage of understanding and gaining local knowledge in the area thereby eliminating a lot of second guessing and assumptions". The early involvement of the alliance team in the planning phase made a significant contribution to the stakeholder management and in establishing relationship bridges to

achieve breakthrough outcomes which are expected to benefit the further development of the project.

RISK/REWARD COMPENSATION FRAMEWORK

The compensation frameworks adopted in the Case 1 and 2 alliance projects have the same alignment of project cost risk/reward based on sharing profits/loss between the owner and NOPs on a ratio of 50:50. As for Case 3, the official commercial arrangement had not been discussed at the time of the study. However, a special mechanism had been put place for the iPAA compensation structure. In principle, the interim alliance were paid its actual costs (limb 1) and corporate overheads (limb 2) incurred in providing the iPAA services. However, due to the fact that the PAA had yet to be signed, there was no mechanism for the pain/gain arrangement (limb 3). The Senior Manager in Case 3 maintained the view that since there was no pain/gain arrangement during this iPAA, all the pain, if there is any, will be borne by the NZTA if any unexpected issues occurred. Nevertheless, due to the importance of ensuring that this interim alliance is behaving like an alliance over a very long period (almost 3 years), a mechanism has been introduced to incentivise and motivate the performance of the interim alliance . One of the main attractions of alliancing is the ability of the commercial model to incentivise the alliance participants with non-cost KRAs that represent value to them (Ross, 2003). In addition, of the three limbs that form an alliance's overall compensation framework, the risk/reward model (limb 3) element appears to exert the most influence on team behaviour (Love *et al.*, 2011) . Alliance participants agreed to have a series of KPI to incentivise the performance of the alliance team during the iPAA phase. The Senior Manager and Design Manager stated that a "series of KPI to incentivise the team has been developed and a fee was set aside [...] we do have some KPIs, trying to give the team some incentives and motivation [...] these KPIs help breed the collaborative way of working" . As for the non-cost risk/reward model, every project has different types of KRAs with different values of bonus payment or penalty based on actual performance measured against non-cost KRAs. Depending on the needs of the individual project, the owner will decide what types of incentive to include to influence the performance of the team.

ALLIANCE GOVERNANCE

In terms of the alliance governance structure implemented, all three cases use the typical three levels of governance, although in Case 2 an additional level called Wider Leadership Team (WLT) was introduced with the aim to distribute the leadership. The establishment of the WLT, featuring clearly defined roles and responsibilities and reporting lines to and from the Wider Alliance Team (WAT), was desirable due to the complexity in managing an urban tunnel project.

While the alliance governance structures appear to be reasonably similar, the representatives involved in the PAB and the designation of the Alliance Manager in Case 3 are worth noting. Regarding the former, the local council is represented on the PAB, although at this stage their role and involvement is still evolving. There was an agreement on the opinions from interviewees that it was taught that the involvement of local council was to indicate that the alliance team is embracing the concept of empowering the council to achieve the consultation outcomes which will maximise benefits for the respective community and stakeholders. Regarding the latter, it was found that the Alliance Manager in the early phase was independent (not from any of the NOPs) and had no construction experience, but he did have a successful track record in managing complex relationships with multiple stakeholders including local and national governments and agencies . Traditionally, the Alliance Manager comes from the main

contractor. Based on the investigation, it is believed that the main purpose of having an Alliance Manager as an independent was because the main focus during this early stage was to shape the relationships with the multiplicity of stakeholders, so that any designation and consenting issues can be finalised and lodged with the EPA within the time planned.

KEY FINDINGS FROM CASE STUDIES

The investigation across these three cases has identified four unique elements to it which indicate significant modifications from the normal alliance practice. The first element is that the construction phase started during the iPAA phase, while the real cost of the project was still under development. This indicates the flexibility of the alliance agreement to adapt to a situation where continuous improvement and change in process are significant (Walker and Lloyd-Walker, 2016). The second element is that the Alliance partners were chosen extremely early in the process and will be working as part of an Interim Alliance during the early phases (e.g. Option development, scheme assessment report, statutory approvals, lodgement with the Environmental Protection Agency (EPA)). Early involvement of partners is the norm in an alliance, where the Alliance Partners would be selected after a recommendation is made by the EPA and the Interim Alliance formed thereafter with the Alliance proper formed in advance of construction. However, the Case 3 project takes the 'early alliance involvement' concept to a new level of alliancing practice. In this case, the external pressures of public engagement as well as issues related to consent and stakeholder, contributed to the decision to have interdisciplinary and inter-firm organizational arrangements in one entity. The third element and fourth elements are related on the governance structure. The third element is that the Alliance Manager, for the above interim alliance, was not appointed from one of the consortium members but is instead independent. The final element is that the local council are an Alliance partner, although at this stage their role and involvement is still evolving. The final two elements came about to response to complex engagement issues relating to key stakeholders and the community at large.

A comparative analysis of these three cases provides a multi-perspective view of the basic features in an alliancing implementation. As this paper reveals, the unique practices identified indicate that alliancing contracting is evolving to suit client and project needs for driving the delivery of complex roading projects with outstanding outcomes. A project alliance, in this context, allows consideration of a wider range of potential solutions as the owner and NOPS are not fixed on any particular project solution to meet strategic goals and are open to suggestions (Walker and Lloyd-Walker, 2016).

CONCLUSIONS

The volume of projects recently completed and still on-going under the management of NZTA clearly represents a breakthrough in the development of alliancing in New Zealand. While typical alliance practices are innovative compared to practices in other procurement types, the maturity of organizations, particularly the owner and NOPS, have taken this a step further by hosting a new generation of procurement methodologies tailored to the needs of a particular project. These innovative practices have brought the alliancing concept to a new level of practice in New Zealand. For example, working in an interim phase over a very long dynamic period, while at the same time behaving like an alliance to ensure the success of the project. In addition, innovation is evident in the appointment of an independent Alliance Manager, as well as taking the local council on board as part of the alliance, in a situation where public engagement issues are significant. The findings show how the concept of alliancing and the flexibility of the alliance

agreement can overcome barriers and improve construction players' ability to manage complexity in different alliance contracting projects.

The findings from this study also have the potential to provide an opportunity for public and private organisations, both nationally and internationally, to understand how these practices could be a point of reference for the purpose of overcoming extreme challenges and achieving "breakthrough" results, where "business as usual" performance would not be sufficient. Finally, it is suggested that further research should be conducted in the context of a longitudinal study to examine the effect of these innovative practices towards the project outcomes.

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