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PROJECT ALLIANCES AND LEAN CONSTRUCTION PRINCIPLES

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ABSTRACT

There is a trend in the construction industry of adopting more and more relational type contracting methods, for example, project alliancing. In addition to this trend, there is increasing adoption of the lean construction principles. This paper explores the inherent relationship between project alliancing and lean construction in an attempt to highlight the similarities between this project delivery method and the lean methodology.

Based on the literature studied and the performed interviews, this study shows that alliancing does in fact inherently align with some key lean construction principles. Particularly in the area of customer focus, culture and people, waste elimination, and continuous improvement. An understanding of how and where alliancing aligns with lean can lead to a better insight into how the model can be improved. Such knowledge could be useful to practitioners looking at incorporating more efficiencies into the alliancing model by introducing lean concepts

KEYWORDS

Alliancing, Lean Construction, Project Delivery Method, Contract, Value.

INTRODUCTION

Project Alliancing (PA) is a relatively new project delivery method (PDM) that has started becoming popular in recent decades as an alternative to both traditional and other forms of relational contracts. In recent years, alliancing has been receiving worldwide attention with more and more countries exploring its use. Having originated in the UK (Manley 2002), it has become a booming success in Australia. The success in Australia has shown the industry that there are methods to delivering projects alternative to the often-adversarial, traditional project delivery methods.

Lean construction is a project management methodology that has adopted principles of lean that originate from the manufacturing and production industry (Ballard et al. 2007; Howell 1999; Locatelli et al. 2013). Lean construction is considered a philosophy or

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paradigm of managing construction projects and not a stand-alone contractual PDM (Ballard and Howell 2004).

Alves and Tsao (2007), through their study of IGLC papers from 2000 – 2006, identified that there has been a lack of research among the IGLC community in the area of relational contracting. They suggested that researchers *"strive to understand how to implement relational contracting, measure its outcomes, and explain project results to help provide guidance to owners that are interested in working towards lean project delivery."* (Alves and Tsao 2007, 57). Ten years later, there is still a gap in the literature comparing alliancing and lean construction. This paper addresses this issue by providing insight into the relationship between the alliancing project delivery method and lean project delivery.

As the adoption of both alliancing and lean principles in the construction industry has started becoming more prevalent, knowledge of the lean principles inherent in alliancing could be valuable to practitioners looking at adopting lean project delivery. Many countries, particularly in Europe, have started adopting alliancing. In addition, Finland, who adopted alliancing in 2007, has begun experimenting with adopting lean ideology into their alliance projects (Petäjäniemi and Lahdenperä 2012). A clear understanding of the current similarities between alliancing and lean could help improve this adoption and could potentially lead to the creation of improved project delivery models.

Integrated Project Delivery (IPD) is a method used mostly in the United States of America that has many similarities to alliancing, with one major difference being that IPD incorporates a number of lean construction elements (Lahdenperä 2012; Raisbeck et al. 2010). IPD's use is mostly concentrated in America, yet the principles of lean are more prevalent worldwide. Alliancing is often considered at the top end of collaborative and relational contracting (Ross 2003) and is more widely distributed across the globe (Chen et al. 2012; Ingirige and Sexton 2006). In addition, IPD and Alliancing have often been used for different types of projects (Lahdenperä 2012). The key differences between IPD and alliancing will not be explored further in this paper but can be found in the study by Lahdenperä (2012).

To address the identified research gap, the following research question was formulated:

Does the alliancing project delivery method inherently align with the principles of lean construction?

By addressing this, the report aims to provide a reference point going forward, for both academics and practitioners, to help understand the inherent relationship between PA and lean construction.

METHOD

The research question was addressed by performing a literature and document study. In addition, results from a series of semi-structured interviews were used. The literature study, following the prescription of Blumberg et al. (2014), was undertaken to develop the theoretical background for both lean construction and PA. This was the primary source of information on lean and was key to gaining insight into lean principles. A combination of both journal articles and conference papers was used to get a broad perspective of the current views of the topics. A document study was performed on a number of key

government and industry publications covering PA, for example, The National Alliancing Contracting Guidelines (DoIRD 2015) and Alliancing: A Participant's Guide (Morwood et al. 2008). This was performed in order to pick up the Australian government and industry perspective on alliancing. Thus, the document study allowed us to gain insight into both the theoretical and practical aspects of alliancing.

As part of a larger study on the experience of Australian infrastructure alliances, twenty-seven semi-structured interviews were undertaken face-to-face with key industry professionals in Australia. The interview questions were formulated in line with the research question, which considered if the alliancing project delivery method inherently aligns with the principles of lean construction. The interviews ran over a period of three weeks during March and April 2016. Interviewees were contacted based on their experience with alliances. Respondents were chosen among project managers and contract specialists, mostly from client side (government) as the research was exploring when and why alliances are selected. In addition, a number of respondents from contractors (8), consultants (3), and professors (1) were included to get a full industry perspective on the current state of alliancing.

Using a combination of the literature study and document study gave a theoretical insight into alliancing. This insight made it easier to infer the ways that alliancing aligns with lean principles. With the theoretical background in place, interviews were performed to gain practical insight. The combination of theoretical and practical insight helped to analyse how the elements of PA align with the identified principles of lean construction.

THEORETICAL BACKGROUND

In order to draw conclusions on the similarities and differences between PA and lean construction principles, an exploration of the current theory on each topic has been undertaken.

ALLIANCING

Alliancing has developed out of the need and want to improve on, and overcome, the adversarial nature and negative impacts associated with the more traditional forms of project delivery, namely design-bid-build (DBB) and design and construct (D&C) contracts (Laan et al. 2011; Walker et al. 2015). It often falls under the umbrella of relationship contracting (Henneveld 2006; Walker et al. 2013), however, now in recent years, it is beginning to be placed into its own unique category (Chen et al. 2010; Lahdenperä 2012). Moreover, Sakal (2005) states that "*It's important to note that Project Alliancing is more than just a contract; it's a new approach to conducting business and constructing projects that's a dramatic departure from traditional contracting practices - where trust is in short supply and antagonism runs rampant*" .

Alliancing is a collaboration between the client, service providers and contractors where they share and manage the risks of the project together (Chen et al. 2010). All parties' expectations and commercial arrangements are aligned with the project outcomes and the project is driven by a best-for-project mindset, where all parties either win together, or lose together (Chen et al. 2012; Sakal 2005; Walker et al. 2013). The contract is designed around a non-adversarial legal and commercial framework with all disputes and conflicts

resolved from within the alliance (Henneveld 2006). This type of project delivery can lead to improved project outcomes and value for money, in part due to the increased level of integration and cooperation between planners, design teams, contractors and operators (Love et al. 2010).

The current most widely accept definition of alliancing comes from the Department of Finance and Treasury Victoria (Victoria 2010, 9) who describe alliancing as:

"… a method of procuring … [where] All parties are required to work together in good faith, acting with integrity and making best-for-project decisions. Working as an integrated, collaborative team, they make unanimous decisions on all key project delivery issues. Alliance agreements are premised on joint management of risk for project delivery. All parties jointly manage that risk within the terms of an 'alliance agreement', and share the outcomes of the project".

Some of the key alliance elements noted from the literature and interviews include open book, integrated project team, aligned client and commercial participants objectives, unanimous decision making and incentivised cost reimbursement.

LEAN CONSTRUCTION

The success of lean as a management philosophy in manufacturing has inspired the adoption into other industries, and particularly into the construction industry. An exploration of the established view of lean construction was undertaken to get insight into its principles. Both lean and the development of lean construction are well described in literature [Lean: (Ballard et al. 2001; Diekmann et al. 2004; Krafcik 1988; Liker 2004) and Lean construction: (Howell and Ballard 1998; Howell 1999; Koskela 1992; Picchi 2001)]. Therefore, this will not be covered in the paper.

Lean principles have been adopted into the construction industry from the manufacturing industry. Lean construction is the management of construction using these principles. According to Howell (1999, 4) there are four points that separate lean construction from traditional practice. *"Lean construction:*

has a clear set of objectives for the delivery process,

is aimed at maximizing performance for the customer at the project level,

designs concurrently product and process, and

applies production control throughout the life of the project."

To take it one step further, we look at the definition of lean construction by Diekmann et al. (2004, iii):

"Lean construction is the continuous process of eliminating waste, meeting or exceeding all customer requirements, focusing on the entire value stream and pursuing perfection in the execution of a constructed project".

In addition to the definition, Diekmann et al., (2004) established five main principles of lean that are relevant to the construction industry:

Customer focus

Culture/people

Workplace standardization

Waste elimination

Continuous improvement/built-in quality

We note that the principles of lean construction are not as extensive as the principles of lean. For example, Liker (2004) identifies 14 principles of lean. To summarise, lean construction is based around maximising value for the customer and minimising waste (Ballard and Howell 2003; Howell 1999; Locatelli et al. 2013).

As well as being based on key principles, lean construction benefits from the use of a number of tools that facilitate these principles. Such tools are presented by Salem et al. (2005) and include Last Planner, Visualisation and Daily Huddle Meetings.

Reasons for adopting lean vary but the results speak for themselves. The work by Locatelli et al (2013) has identified shorter delivery time and higher project performance as being the most common benefits of using lean construction. Ballard and Howell (2003, 132) state that *"Even partial implementations have yielded substantial improvements in the value generated for clients, users and producers".*

FINDINGS AND DISCUSSION

We have chosen to use the five principles identified by Diekmann et al. (2004) to represent the key principles of lean construction. This section will explore the principles of lean and look into what extent project alliancing inherently aligns with each principle. The discussion presents the authors' interpretation of the studied literature and interviews. We begin by comparing lean construction and alliances with traditional practice before focusing on the five main principles of lean relevant to the construction industry.

LEAN CONSTRUCTION AND ALLIANCES COMPARED WITH TRADITIONAL PRACTICE

By looking at each of the four points identified by Howell (1999, 4) that separate lean construction from traditional practice, we can see that alliancing aligns closely with lean construction.

Alliancing *has a clear set of objectives for the delivery process*, all of which are well documented in the alliance agreement. They are also regularly communicated to the team through various mechanisms that maintain the single alliance culture. At the project level, alliances *aim to maximise the performance for the customer*. They do this by developing a number of Key Result Areas identified by the client and incentivising them to drive performance. The commercial arrangement also drives this behaviour. All parties are aligned; what is best for project is also best for all parties. Thus, when a non-owner participant (NOP) works to maximise their outcome, this in turn should maximise the outcome for the client. A key aspect of alliances is the integrated team from the very beginning of the project. This allows alliances to *design both product and process concurrently*. Identified by many of the interview participants, as being a key benefit of alliances, is that normally sequential processes can run in parallel. The last point is where the comparison deviates. Alliancing has not been known to *apply production control* to the extent outlined in lean construction.

Lean construction is stated as being practical and beneficial to projects that are quick, uncertain and complex (Howell and Ballard 1998). One of the key findings from the Australian interviews was that the top three reasons why alliances are chosen as the project delivery method are that the project had 1. a tight timeframe and/or need for an early start, 2. had high uncertainty, and/or 3. was very complex in nature. We believe that this is an important finding because it verifies that PA and lean construction are two approaches to addressing the problems associated with quick, uncertain and complex projects.

CUSTOMER FOCUS

Alliancing, by nature, is a very customer-centric model. The inclusion of the client in the integrated team ensures that the client is imbedded in the team for the duration of the contract. This allows the client to maintain a large amount of control throughout the entire process. Combined with the open book approach, this also gives the opportunity for the Non-Owner Participants to develop a greater understanding of the customer, what they want, need and value as well as their motives, policies, constraints etc. On the other hand, the client gains valuable insights into the way consultants and contractors operate. This goes a long way to helping the alliance satisfy the customer.

Alliances aligns with this principle of lean as alliances are largely driven by value-for-money. Based on the findings from the interviews, most clients are aware that alliances can be expensive to establish, but choose them for certain projects as they often deliver better value for money than traditional contracts. Clients "pay" for it in that they must be able to commit high-level resources and senior people to achieve the best outcome and value. The Client/customer defines what they value and applies incentivised Key Results Areas (KRA) to drive behaviours to achieve the identified areas of value. Given the track record of most alliances, alliances deliver quality results the first time. They often reduce or eliminate re-work. A large part of this is due to the fact that the client is imbedded in the team.

CULTURE/PEOPLE

Alliances have particular team and personal selection processes. People are selected for roles within the alliance on a best for project basis. People are respected for the knowledge and skills that they can contribute to the project, regardless of their parent company. Locatelli et al. (2013) state that team member training is the most important investment when considering lean construction implementation. This aligns quite well with the results from the Australian interviews where the most mentioned key success factor for PAs is the team. Hence why most PAs follow strict team member selection processes.

During the start-up of the alliance a lot of work is put into developing a single alliance team culture. Alliance workshops and team building activities are performed on a regular basis and because a large emphasis is placed on team culture these activities are continued throughout the life of the project.

WORKPLACE STANDARDISATION

At this stage, our research has uncovered little evidence of workplace standardisation in alliance projects. It seems that alliancing lacks an established set of processes and

procedures that resembles that found in lean construction, for example, the 5S tool (sort, straighten, sweep, standardize and systematize) (Salem et al. 2005).

WASTE ELIMINATION

For all the types of waste identified in lean construction (Hines and Taylor 2000), we believe that PA can minimise or eliminate waiting, defects and inappropriate processing. We also believe it can reduce waste caused by variation and the disengagement of people.

Waiting is addressed by the concurrent engineering processes inherent in PAs. Defects and extra processing are often reduced due to the higher quality and performance associated with alliance projects. Variations are minimised or eliminated due to the fact that all parties, including the client, are all part of the one team and any issues that arise are dealt with right away. The results of the interview series in Australia identified that alliances address the disengagement of people. The majority of people interview favoured working on an alliancing project over any other form of contract. Provided the right people are selected to work on the alliance team moral and engagement is kept at a high. Expanding on the previous point, waste is eliminated as the right people are often being used for the right positions, regardless of parent company. This ensures efficient use of resources and eliminates doubling up of resources.

Ballard and Howell (2003,128) estimate that *"as high as 50% of design time is spent on needless (negative) iteration"*. Although no comparable statistic has been found for Alliancing, it would appear that it would be considerably lower when it comes to alliances. Alliances have everybody together, and in the same room, from day one. This means that all parties have an input into the design process. The client can immediately eliminate designs that do not comply with their wishes. In addition, the contractor can identify when designs are not practical and highlight where efficiencies in scheduling, construction methods, material etc. This immediate feedback means that needless designs are not progressed and design rework is minimised.

CONTINUOUS IMPROVEMENT AND THE STRIVE FOR PERFECTION

Alliances encourage open dialogue between all members and decisions are required to be made as best for project. This can lead to moving outside of traditional specifications and requirements associated with traditional contracts. Alliances can accommodate scope change and deal with changes and issues as they arise. In addition, alliances are always challenging the schedule to see how to improve it along the way or to mitigate delays. The commercial and legal framework of alliances facilitates this by removing issues associated with variations. The alliance mindset is to deal with challenges and setbacks as a team.

Alliances have a no blame culture. Lessons learned are distributed throughout the alliance on a regular basis. Everyone is on the same team. Guided by standards but are able to challenge them when necessary. Alliances commit to developing and sustaining an alliance culture that respects the principles of the alliance.

In the view of those interviewed, alliances often deliver "state-of-the-art" results and outcomes as they have a large focus on delivering results. Incentivised cost reimbursement is one way to facilitate this, particularly in non-cost areas as safety, quality, environment

etc. All decisions made are best for project. The client can up skill their employees by exposing them to different aspects of the industry by embedding them in the alliance.

CONCLUSION

Based on the literature studied and the performed interviews, this study shows that alliancing does in fact inherently align with some key lean construction principles, particularly in the four areas of customer focus, culture and people, waste elimination, and continuous improvement. The research lacked sufficient evidence of alignment in the fifth area of workplace standardisation. To give a visual representation of the alignment between PA and lean construction we refer to the lean construction triangle in **Error! Reference source not found.**. There is sufficient evidence for PA alignment with the organisation and commercial sides of the triangle. Alliancing aligns with the principle of customer focus, a key element of the commercial side of the triangle. On the organisational side, we have shown the alignment in the areas of culture/people, waste elimination and continuous improvement.

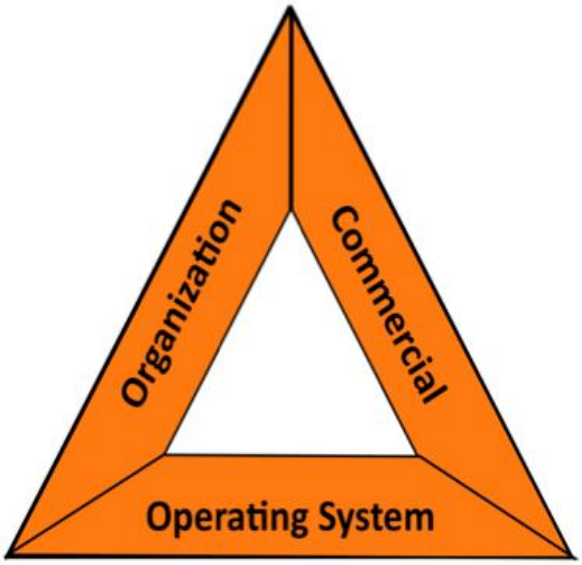

Figure 3: The Lean Construction Triangle (Lean Construction Institute)

A key difference between PA and lean construction appears in the operating system. Alliancing lacks the workplace standardisation and the use of lean construction tools identified with lean construction. Further research into this area could determine whether alliancing would benefit from directly incorporating the principle of workplace standardisation and/or the lean construction tools.

An understanding of how and where alliancing aligns with lean construction can lead to a better insight into how the model can be improved. Such knowledge could be useful to practitioners looking at incorporating lean principles and tools into the alliancing model; such is the case in Finland. It could also prove useful to those looking at developing improved collaborative contracting models. This study does not claim that alliancing is a lean project delivery method, but rather that it inherently contains qualities of lean. To sum up; alliancing can be the starting point for an owner interested in the lean project delivery system, as it aligns with many of the lean construction principles.

This paper aims to generate future research and discussion around the relationship between lean construction and alliancing. For example, an in depth look into comparable cases of lean construction and alliance projects could lead to a better understanding of the similarities between the structure, process and performance of both methods. In addition, as the clients continue demanding projects with improved outcomes, higher efficiencies,

less cost and less waste, the development on new project delivery methods incorporating lean principles could be an answer.

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