HEAD CONTRACTOR ROLE IN CONSTRUCTION MANAGEMENT FROM A VALUE PERSPECTIVE

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ABSTRACT

Value in construction is gaining momentum in literature and is central to many practitioners and researchers working within the realms of Lean. Yet value has been defined in so many ways and used to mean many different things, often linked to cost, time, objectives and customers that there exists no concise and complete description of what constitutes value within a construction context.

Many methodologies, tools and applications presented to date appear to have surfaced through the emerging theories of value, which in turn are adopted from other industries. However, considering many peculiarities identified in construction and that the biggest cost centre in a construction project being construction itself, it is important to explore in detail the current perceptions of value by the head contractors (HC) and subcontractors (SC).

This paper focuses on the HC role in construction. It argues that while value generation and its management in general as a separate function may be relevant at a broader construction project perspective, value management in the construction phase (construction) is currently understood as intrinsic to flow and transformation (task) management. It presents a list of activities identified by HC and SC as key to efficient progression of construction and shows that value management is inherent in the construction coordination activities. These results are compared with other emerging principles of value together with relevant construction peculiarities. Further research is recommended in advancing the role of HC in overall construction organisation.

KEY WORDS

Lean Construction, TFV Theory of production, Value based management, Head contractor role.

INTRODUCTION

Value as a concept has gained momentum within construction research. Investigations to date have looked at theory building (eg: TFV Theory of Production by Koskela, 2000), management principles (eg: Value based management by Wandahl and Bejder, 2003) and applications and tools (eg: Construction Process Analysis by Lee et al, 1999). The next phase in refining these concepts and developing methodologies would be to introduce to real projects and construction organisations. However, two challenges have typically been faced in implementing change in construction, particularly in Australia.

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INDUSTRY CHALLENGE

Many research projects have been derailed when it comes to implementation in the industry due to challenges in getting buy-in from the practitioners to commit to adopt the ideas on site. This is partly fuelled by the authors' observation that construction projects in Australia as in many other countries are saturated with planning and conformance related paper work. In fact, it is not uncommon to see some HC utilising more direct resources to complete paper work and planning than actually doing or coordinating works on site. Does this mean the construction industry is performing at its best? Far from it: in fact, its deficiencies in productivity, quality and customer satisfaction are well documented and compare very poorly against other comparable industries. Yet, most HC managers are united in their resistance to introduce any more paper work, analysis tools or procedures unless there is clear evidence of its relevance, benefits and more importantly there is no duplication with existing activities and better still, it replaces any existing activities. Therefore, it is very important that any applications, tools or methodologies derived from the emerging theories consider existing perceptions and tools rather than attempting to introduce another set under the umbrella of value management.

RESEARCH CHALLENGE – FITTING ADAPTED PRINCIPLES WELL WITH CONSTRUCTION PECULIARITIES

The challenge in research itself is to come up with theories and methodologies that are based around the construction peculiarities identified. As many ideas currently being investigated (such as lean, supply chain, quality circles, service quality, etc.) have come from other industries having dissimilar characteristics, this is harder than it typically sounds. An important observation here is that one cannot pick parts of the construction industry or process to fit with the theory or tool adapted from another industry, rather one needs to pick parts of other theories and tools to fully fit with the construction characteristics. This becomes even harder as the construction characteristics at macro environment (this is considering a construction project as a whole) differs from its own micro environments (this is a phase in a construction project like construction phase or design phase). Hence, any concept 'generalised' to a construction project at 'macro level' does not necessarily mean it can be successfully used at 'micro level' particularly during construction phase. A good example is supply chains. While the general ideas of supply chain fit well for an overall construction project, Perera et al (2009) argued that supply chain in construction phase takes a different view in order to get maximum benefits. This is attributed to some unique characteristics evident within the construction phase that make it difficult to use the same concepts developed at macro level. Given the significance of 'value' in construction and its place in emerging theories it is important to assess whether the ideas presented at macro level can also be applied during construction phase.

HYPOTHESIS

This poses the question 'how best can value be addressed in the construction phase'? In addressing this question it is important to understand 'how relevant are the emerging value concepts to construction phase, in particular the HC role as the main organiser and manager and how does it compare with the current perceptions of HC and SC'?

Specifically, this paper argues, that 'value' as currently understood by HC and SC during the construction phase is different from 'value' typically described in value generation and value management for the overall construction project in lean literature and production theory. In particular value is currently understood as an inherent part of typical construction activities (flow, transformation and support activities) and this paper argues that a management process that recognises this and maintains it such as value based management is best suited to improve the construction phase.

HEAD CONTRACTOR ROLE IN CONSTRUCTION MANAGEMENT

The present construction[4] setup sees subcontractors carrying out up to about 90% of the physical construction while the head contractors have increasingly moved away from construction activities towards management and coordination roles. This can then be generalised as subcontractors doing construction tasks and head contractors doing construction enabling tasks. Tommelein and Ballard (1997) used 'production planning' and Koskela (2000) used the term 'preconditions' to represent a similar meaning. However, in this paper 'construction enabling tasks' is used to mean more than specialist coordination and preconditions and includes tasks carried out after the completion of a construction task such as sign-off, feedback, etc. which can be called 'post-conditions' and together is known as contract management.

While advocating for detailed production planning, Tommelein and Ballard (1997) presented eight tasks as necessary to be performed in a construction coordination role typically by the HC. However, it is not clear how these tasks were developed or their current levels of performance. Hence in order to develop a list of construction enabling tasks that best facilitate efficient construction, a team comprising of representatives from HC and SC was formed.

A series of meetings and interviews were held with sixteen industry partners (six head contractors and 10 subcontractors) and over twenty other subcontractors on six construction projects in Sydney to develop a list. The list was developed by the HC and SC themselves. This list comprised of tasks carried out by the head contractor that affected the construction tasks done by subcontractors. The agreed list was then rated by thirty participants both from head contractor and subcontractor organisations across the six projects for their perceived performance. The results are summarised in Table 1 below. The ratings are on a scale of 1 to 7 with 1 being 'never' and 7 being 'always'. So, a higher value means a better performance. 'You' in the activities refer to SC.

The results confirm the coordination tasks presented by Tommelein and Ballard (1997) and add new perspectives like problem solving through technical capabilities, performance feedback in addition to timely sign-off and payment and effective flow and access management.

[4] Construction is used in this paper to mean the 'construction phase' of a construction project and to mean production whenever it refers to a production concept such as production management.

Table 1: HC Construction enabling tasks: summary of performance as rated by HC and SC (values between 1 and 7 with 1 being never and 7 being always)

Task No	Activity	Self rating by HC	Rating by SC
1	Come up with programs that provided you with an efficient workflow	5.00	4.15
2	Co-ordinate and sequence trades effectively	5.38	4.43
3	Give you the opportunity to influence the program	4.50	4.48
4	Coordinate design information properly	4.86	5.00
5	Provide clear access to work areas when promised	6.00	5.05
6	Provide constructive feedback on your performance	4.88	5.05
7	Carry out material handling when required (eg crane lifts)	6.63	5.16
8	Solve problems quickly and fairly	5.00	5.27
9	Demonstrate technical competence in understanding your trade practices and requirements	5.00	5.32
10	Effectively organise the site	4.75	5.41
11	Accept your signed-off areas as complete	4.75	5.56
12	Communicate with your team	5.50	5.59
13	Enforce OHS and cleanup on site	5.00	5.64
14	Indicate an attitude that defects should be fixed sooner rather than later	5.50	5.64

It also recognises a cultural perception (task no 14) as an important aspect of construction enabling task. The list does not include any traditional 'contract management' activities. However, timely procurement of resources including subcontractors and material is linked to tasks 2, 3, 7 and 10 and prompt payments are linked to task 11. One observation highlighted in the activity list in table 1 is that the idea of value is incorporated into the typical support activities identified. Specific value generation or value management activities were not identified as activities of its own in the list. The details of value management activities are discussed later. However, during interviews conducted after the completion of these surveys, the points below were echoed that related to the respondents' understanding of 'value':

Value as understood by SC refers to delivering SC's individual work to the HC on time within budget;

Value in HC tasks above is to enable SC to deliver their value target. This is achieved by completing HC tasks 'efficiently', 'effectively', 'properly', 'fairly', etc. and are already incorporated into the tasks above;

There are no specific tools used to carry out or measure value at present other than existing quality and financial analytical tools;

Value for HC refers to delivering defined product specifications (product value) and managing the delivery process cost effectively (process value); and

One half of the tasks that HC rated as a better performance received a comparatively lower rating from the SC and the vice-versa for the other half.

It is now important to compare the above results with emerging value concepts with reference to some key peculiarities of construction.

CONSTRUCTION PECULIARITIES

The construction phase is characterised by some unique features that make it challenging to effectively introduce ideas particularly those adopted from other industries. Koskela (2000) reported a list of peculiarities identified by many researchers. What is missing in that list is the unique interplay between the HC and SC and between preceding and following SCs which often blurs the definition of internal and external customer and between project and organisational drivers.

Ishikawa (1985) pointed out the use of the 'next process as your customer' in order to optimise each process. Perera et al (2009) confirmed that this is not well understood or practiced in the construction industry even though one SC builds on the work of the preceding SC. He successfully implemented a handover quality check mechanism shift the focus on HC to the following SC as the customer.

Koskela (2000) argues that internal customerships should be subordinate to the consideration of the 'customer proper', which is the external client. While this is true from a purely project perspective, each trade in construction is an organisation on its own. Hence, for each SC the HC and even the following SC is an external customer. Due to the temporary nature of the project and the permanent nature of the organisation, the external view of customer takes precedence within the project environment. SCs hardly have any contact with the end user or the 'customer proper'.

During the life of the project, the many organisations that make up the project team need to grow, and add value to the organisation as well as recognised in the original 14 lean production principles of the Toyota Company (Liker, 2004).

VALUE IN LEAN

Salvatierra-Garido et al (2009) reports many researchers who have identified the significance and difficulty in defining and approaching value within the construction industry. Value, within the principles of Lean Thinking for example refers essentially to product and/ or material. Thus, specifying value, identifying value stream and un-interrupted value flow all refer to product and/ or material flow (Womack and Jones, 2003).

Koskela (2004) in arguing that theory of lean production goes beyond lean thinking, says value generation for example have been largely left out from the lean thinking principles which makes it unsuitable in particular for one-of-a-find production types such as construction. Wandahl and Bejder (2003) highlight ethical values which in Value Based Management called Process Value. Another approach to deal with value has been to focus on non-value adding activities largely referring to waste. These are discussed in detail below.

TFV THEORY OF PRODUCTION

A three way production approach called the TFV theory of production (first reported in 2000 by Koskela) provides an excellent reference to relate construction management and the HC tasks as identified earlier. It assumes construction to be addressed through production management and presents three competing, yet supposedly complementary aspects of production management, namely transformation, flow and value generation. Bertelsen and Koskela (2002) then translate the TFV concept to an operational setting using contracts management,

process management and value management as managerial attention changes in a cycle. The current TFV model has been interpreted to two construction activities (bricklaying and rendering) in Figure 1 below.

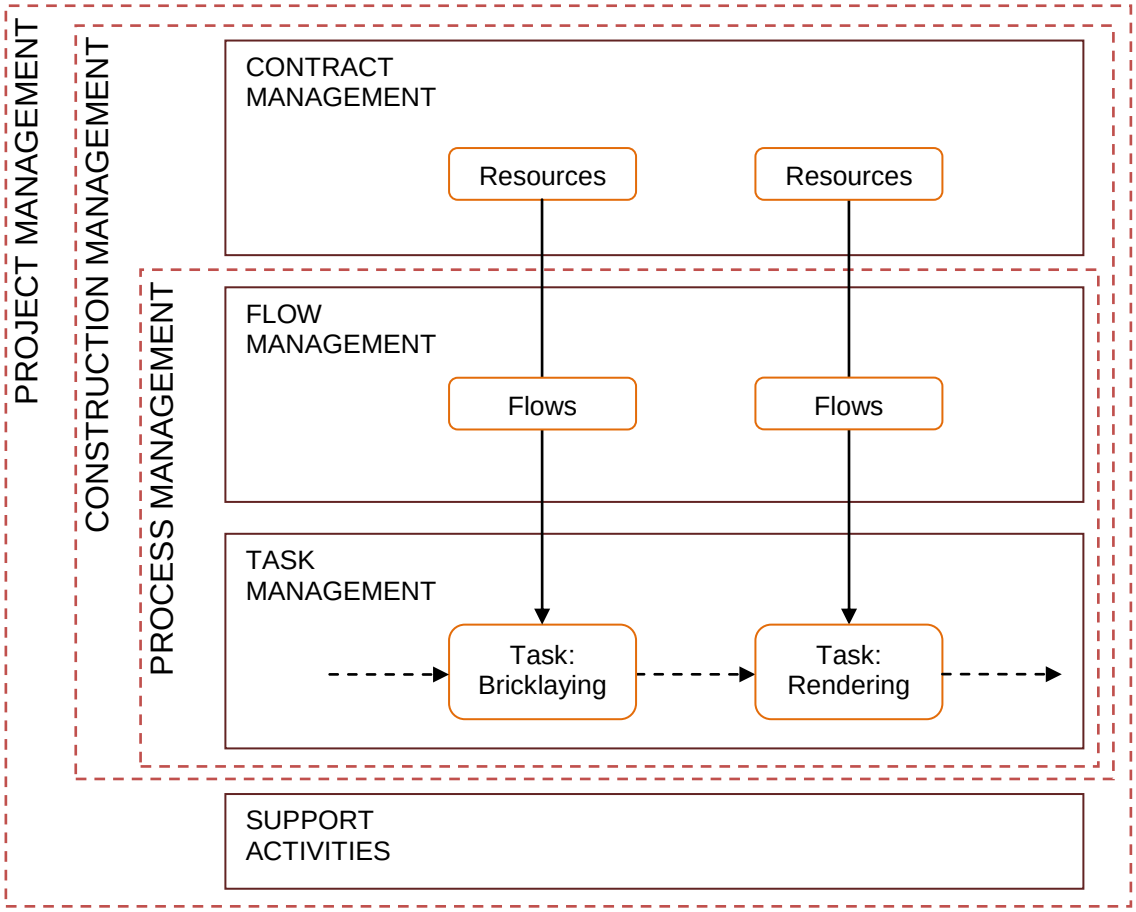

Figure 1: Head Contractor management overview of Construction

It must be noted that here flow and task management are viewed as subsets of process management rather than the interface between task and flow management as presented by Bertelsen and Koskela (2002). A notable absence from the above model is 'value management'. This is due to the argument that specific value management tasks carried out during construction management that are not already covered in the above management roles were not identified during surveys and interviews. This needs to be discussed further.

For a SC, the contract with the HC to carry out a task in a construction project is a project on its own. Value definition in this relationship is by the HC as the external customer to the SC and value management takes place during the delivery of that task. However, in the overall construction sense, this is one task and is already covered in the task management sphere. Value generation for the overall project however, happens at the initial stages of the project cycle between the client and designers. Value generation defined as the realisation of product as specified (Koskela, 2000) therefore is already covered in quality definitions during construction. Hence, the view of value as the relationship between quality and cost may be best theorised by accommodating a customer-supplier model as in value generation within a combined flow and task (transformation) model as shown in figure 1. In other words, a Value Based Management (VBM) which recognises process values defined by internal customers and suppliers in addition to product values defined by the construction

client incorporated within a combined flow and task model provides a more practical framework for improvement during construction phase.

VALUE BASED MANAGEMENT

VBM could be perceived as a combination of 'Management of Values' and 'Management by Values' and relate to product values and process values respectively (Wandahl and Bejder, 2003). In construction, the final product values are determined in relation to the end client. However, the client has little interest in progressing the production of components to achieve the end product. Hence interim values need to be determined by the HC for each SC task. Further, client has little interest in the process values in construction and are determined in relation to the HC as the customer. This is illustrated in figure 2 below.

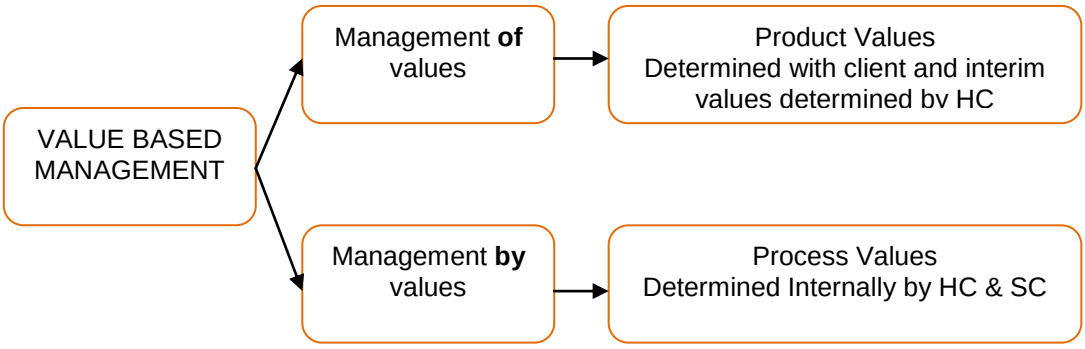

Figure 2: Two values within VBM as applied during construction

VALUE ADDING ACTIVITIES (VAA) AND NON-VALUE ADDING ACTIVITIES (NVAA)

Another point of reference commonly found is the concept of "value adding activities" and "non-value adding activities" as a way of characterising/ categorising activities with definitions presented around economic or customer perspectives. While it has been clear where activities such as bricklaying and waiting for instructions (Alwi et al 2002) fit in, practitioners appear to have struggled to allocate all typical construction activities to one of the two categories above. Hence, a grey area between the value adding and non-value adding activities (Saukkoriipi, 2004), an alternate four category value added scheme Kaplan and Cooper (1998), etc. have proposed.

While there has been no specific evidence in literature of the analysis of HC construction management activities between VAA and NVAA, transformation concept and flow concept can be generally classified as VAA and NVAA respectively (Koskela, 2000).

CONCLUSIONS

The discussion above is used to summarise the HC tasks identified earlier and presented in table 2 below:

From the above it can be concluded that:

The existence of many organisations within one project makes it necessary to consider the internal customer view of HC and SCs in a production framework;

This explains why the construction phase has been popularly seen from a transformation perspective;

All HC activities in process management could be categorised into task and/or flow perspective from the TFV approach and they all have a value aspect (quality and cost) inherent in each activity; and

A combined transformation and flow management framework that incorporates VBM from an internal view point throughout its task and flow management activities may provide a better framework for process improvement rather than separating the value aspect to a separate role or activity within construction.

Table 2: Construction enabling tasks as identified and rated by HC and SC

Task No.	Value Aspect	TFV view	VBM view
1	Minimise waiting time, improve efficiency	Task Mgmt	Process
2	Avoid defects by communicating needs and information	Task Mgmt	Process
3	Minimise waiting time, working in the same area	Task Mgmt	Process
4	Avoid defects, waiting times	Task Mgmt	Process
5	Improve efficiency, avoid waiting	Flow Mgmt	Process
6	Organisational learning, improve efficiency	Task Mgmt	Process
7	Minimise waiting time, improve efficiency	Flow Mgmt	Process
8	Minimise waiting time, improve efficiency	Task & Flow	Process
9	Minimise waiting time, improve efficiency	Flow Mgmt	Process
10	Improve efficiency	Flow Mgmt	Process
11	Reduce rework costs	Task Mgmt	Process
12	Minimise waiting time, improve efficiency	Task & Flow	Process
13	Minimise waiting time, improve efficiency	Task & Flow	Process
14	Avoid defects	Task Mgmt	Process

FURTHER RESEARCH

While this paper provides detailed insights into the organisation of construction enabling activities by the HC, it needs to be incorporated with actual construction activities performed by the SCs. Currently, the construction schedules focus almost entirely on SC activities and enabling activities and hence their value aspects are not considered effectively in practice. Further research is required to enable this marriage possibly through the use of simplified construction process analysis or modified value chains to refine their applicability to provide a robust framework to identify, manage and measure improvement of process and product delivery during construction.

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