

## **The application of lean production to project management**

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### **Abstract**

Project management that solely focuses on the management of time, cost and quality cannot comprehensively ensure the satisfactory meeting of a customer's needs. Project management performance with regard to this issue can be improved by enhancing project management's ability to meet a customer's needs.

This paper introduces *lean project management* to address this concern. Lean project management forms a complementary approach to current project management practice and has been constructed by drawing together two approaches: *management of projects* and *lean production*. The management of project's emphasis on meeting customer needs effectively and lean production's emphasis on meeting customer needs efficiently are utilised in lean project management to improve project management performance.

The amalgamation of lean production with management of projects to form lean project management is examined and justified at the methodological level.

Key words: lean production; new production philosophy; methodologies; method; project management; management of projects; lean project management.

### **Introduction**

In the building industry there is an integrative function commonly termed project management. This function is usually driven by the management of time, cost and quality. However, consideration of these factors alone is often not adequate to ensure satisfactory performance.

It is a general characteristic of practitioners in most industries to improve performance for competitive advantage (Porter, 1985). Performance can be measured against value, ie. meeting the customer's needs. Improving performance has two key components: doing it more effectively, and doing it more efficiently. Effectiveness refers to maximising value of the output whereas, efficiency refers to minimising or eliminating non value-adding items in production. Performance is therefore described in terms of attaining value effectively and efficiently.

Lean production is an approach that emphasises attaining value efficiently. Its application in other industries, such as the automotive industry, has brought about significant performance improvement (Womack et al, 1990). Such improvement has been attained through the introduction of tools such as supply chain analysis.

Morris (1994) coined the term *management of projects* to reflect a wider approach than the specific range of elements inherent in conventional project management. He compares the management of time, cost and quality factors with a more holistic approach that takes a wider

perspective such as taking into account environmental factors. This approach is considered to reflect an emphasis on attaining value, and therefore improving performance, effectively.

This paper recognises the opportunity to link these two approaches to improving project management performance as a valuable one, and terms this amalgamation, *lean project management*. This approach and the linking of lean production with management of projects are examined and justified at a methodological level.

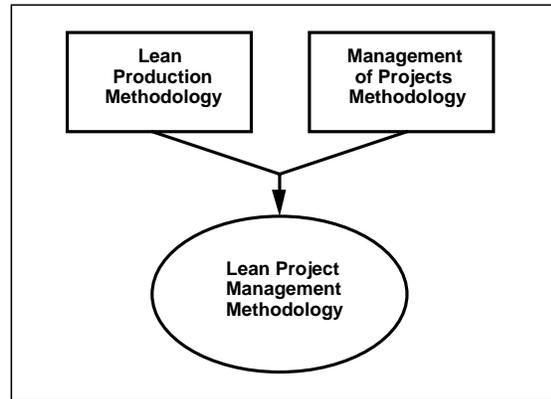


Figure 1: Generation of the Lean Project Management Methodology.

### **Project management**

There are many definitions of project management to suit different purposes. This paper considers project management; the role of managing the whole project from inception to completion ensuring that the client's interests are continually represented (CIDA/AIPM, 1995). It is not important to this discussion whether or not that organisation be a department within the client organisation, an independent consultant or a component of an organisation that performs some other role within the project (ie. architect or builder). The project management function is that of overseeing the whole project, and commonly focuses on time, cost and quality (CIDA, 1993).

Whilst lean production emphasises process and its efficiency, particularly in relation to production, the notion of process is not new to project management. Project management itself has been described as a process. Cleland (1994) states that 'project management is a series of activities embodied in a process ... in order to reach the project [completion]' (Cleland, 1994, 39). Thus project management is described in functional terms as planning, organising, motivating, directing, and controlling. Furthermore, project management operates closely with the project it is managing. Many projects, particularly those in construction, possess a life cycle which consists of series of phases (CIDA/AIPM, 1995). Thus management's structure and organisation take a project- rather than firm-based form and it is this feature that distinguishes project management from other management forms (Cleland, 1994). Thus project management is open to the possibility of process improvement.

### **Lean production**

The lean production methodology adopted in this paper is that described by Koskela (1992). Koskela identified two key concepts as forming lean production. These were Just In Time (JIT) and Total Quality Control (TQC). It is from these which related fields have developed such as *benchmarking*, *continuous improvement*, and *supply chains*, etc. Furthermore Koskela coined the phrase *the new production philosophy* to differentiate lean production thinking from conventional thinking which he termed *the conventional production philosophy*.

The new production philosophy contains the idea of documenting flow and value elements in addition to conversion activities in a production process. Flow as described by Koskela (1992) refers to production activities between conversions that exists in all production systems. Activities such as waiting, inspecting and moving are different from conversions in that they do not add value to the output but exist in all production processes. Value refers to meeting the customer's requirements.

Lean production is a generalist term used to describe the notion of the lean production approach. The authors adopt the view that lean production is a suitable general term rather than a specific component of the wider notion while accepting that there is some conjecture on this point.

### **Management of projects**

Morris (1995) coined the expression *management of projects* when developing a new model for enhanced project management. The rationale for this endeavour was that successful management of a project required a vastly increased range of issues and topics than a 'middle-management, tools and techniques, view of the subject' (Morris, 1995, 217) which he suggested prevailed in contemporary project management. His model embraced an intra-project perspective and contended with the project's environment. The management of projects differs from project management in terms of the increased range of factors with which it contends and this provides the basis for its methodology.

Identifying the factors that impact on a project and more particularly how the project interacts with its environment is a significant contribution in Morris's (1995) model. Although Hughes (1989) had earlier identified a much greater number of environment factors, he did not extend this work to discuss the impact on the successful completion of the project as Morris has done. Both authors did however acknowledge that environment factors differ in relative importance and impact depending on the particular circumstances of the project. Management methods need to identify the factors, the points of interaction and the impact of these factors on and throughout the project, as early in the project as possible.

### **The methodological framework**

This paper adopts Green & Simister's framework that draws a distinction between a method and methodology (Green & Simister, 1996). Under their approach, a methodology 'encompasses the philosophical and theoretical beliefs that underpin and lead to the method' (Tomlinson, 1990). Within a particular methodology are certain assumptions about relationships, the nature of the field, etc. The methodology 'offers a set of guidelines or principles which in any specific instance can be tailored to both the characteristics of the situation to which it is applied and to the people using the approach' (Checkland, 1989).

The method rests below methodology and below that lie the tools or techniques. Particular methods are derived from their methodology. They are more defined than methodology by an order of magnitude (Tomlinson, 1990). Techniques or tools are very particular as compared to methods and methodology. The intent behind them and the circumstances of application are largely specific.

These principles are illustrated in project management. Traditional management by this technique concentrates on certain objectives, being cost, time and quality. These have led to particular methods being applied within the field, such as time, cost and quality management. These may be further broken down into techniques, for example time management has certain tools such as CPM and PERT.

This discussion lies within the above framework, and discusses the contention that just as lean production over conventional production improves value, so management of projects over conventional project management improves value.

The assessment is conducted on the basis of management perspective. Two key ideas are revealed in the comparison:

- Each methodology addresses a similar problem for their field; that the existing methodology lacks comprehensiveness for contemporary production systems and construction projects respectively.
- Each methodology embodies a comparable solution to the problems of the existing methodology; augment the existing narrow methodology.

Thus it is argued that because the problems and the solutions adopted bear similarity across the two fields, a connection exists between the two methodologies. Furthermore, when brought together, a new methodology for project management is developed.

### ***Lean production versus conventional production***

The conventional production methodology is to manage the production process by managing the conversion of an input to an output (Wild, 1995). Lean production complements this methodology. The methodology of lean production is to manage the production process by managing the conversion of the input to output, how the input flows through conversion to the output, and maximising the value of the output in the most efficient way possible. The change in methodology is the introduction of the flow and value elements for management concern on an equivalent par to input, conversion and output. Thus the former management methods of input, conversion and output management have the addition of flow management and management of value under the lean production methodology.

The assumptions of efficiency and effectiveness inherent within the conventional methodology are adjusted under the lean production methodology. Those pertinent to this discussion are considered below:

- The conventional approach emphasises efficiency and has little regard for value; it is usually measured as the ratio of output to input (Koskela, 1992). Furthermore, it is assumed that a production process can be isolated into sub-processes, the improvement of which provides a commensurate improvement in the overall process. With lean production the introduction of flow adjusts this understanding. Rather than adopting a *reductionist doctrine* to complexity, it assumes a *holistic* approach (Flew, 1979) to the production process and the relationship between its sub-processes. Thus the agenda for improving efficiency becomes minimising or eliminating non-value (ie, improving flow) rather than merely improving the output to input ratio.
- Effectiveness is expanded under lean production with the introduction of the notion of value. As Koskela (1992) stated value is not a specific component of the conventional approach. There is an attempt to contend with the customer's requirements but this extends barely further than market requirements and lowering costs. Lean production introduces fulfilling the customer's specific requirements in some instances to the point of customisation. This places a much greater emphasis on maximising the value of the output.

There have been two reasons why production management requires this change (Koskela, 1992). Firstly, under the conventional methodology it has been found that inappropriate control mechanisms and performance improvement efforts have been in place. Secondly, that quality is poorly understood and addressed under the conventional methodology. Both of

these issues relate to poor effectiveness and efficiency residing in the production process and stem from an inadequate understanding of the production process.

The management methodology of lean production is based on the *new production philosophy* (Koskela, 1992). Given the benefits that have accrued to the automotive manufacturing industries (Womack, et al, 1990), it could fairly be argued that the existing conceptualisation was too simplistic. The solution of lean production was to augment the existing approach and make it more appropriate for contemporary and complex production systems.

### ***The management of projects versus project management***

Modern project management adopts a methodology that a project can be adequately managed by managing time, cost and quality (CIDA/AIPM, 1995). In contrast the methodology of the management of projects is that a project requires the management of all factors that impact on the project (Morris, 1994). In addition to time, cost and quality; factors such as project scope/definition, human resources, communication, risk, procurement and environment are incorporated into the realm of management concern and thus form the new management methods.

The assumptions of efficiency and effectiveness inherent within the conventional project management methodology are adjusted under the management of project's methodology. Those pertinent to this discussion are considered below:

- There is little explicit regard given to efficiency in either project management or the management of projects in the same sense that this might exist in production, other than perhaps the relative impact of improvements. Efforts to improve efficiency of the process are discouraged by the project focus of construction. Occasionally alternative procurement approaches are developed and utilised that seem to offer efficiency improvements, however the notion of continuous improvement and other such benchmark measuring techniques are yet to mature in the industry to allow a focus on efficiency to develop.
- A project can be more effectively managed by managing not just time, cost and quality but other factors that impact on a project. Effectiveness is enhanced by ensuring that management accommodates all factors that contribute to the successful completion of the project. Most complex projects cannot be adequately defined in terms of time, cost and quality. Thus management must embrace those other elements influencing the project to ensure accurate definition and identification of client requirements.

It is clear that the central feature of the change from project management to management of projects, is the enhancement of management effectiveness. That is, the definition of client requirements in a more enhanced form. It may be concluded that this will enhance the opportunity to meet the customer's requirements.

### ***Lean Project Management***

The methodologies of lean production and the management of projects can be combined to develop a new approach to project management: *lean project management*. This new methodology would improve both the effectiveness and efficiency of project management services by utilising the management of project's emphasis on effectiveness and lean production's emphasis on efficiency. Thus the new methodology is defined as ensuring the maximum effectiveness by defining the project requirements in terms of all factors that will influence the project and managing the project process to ensure efficient performance by paying particular attention to how value is attained.

It is often difficult to distinguish between effectiveness and efficiency and many would loosely regard them as synonymous. Whilst there is a close relationship between the two, it has been shown that lean production emphasises efficiency (with effectiveness becoming more prominent more recently in lean production efforts) and that the management of projects emphasises effectiveness.

As both methodologies emphasise performance improvement by improving the way in which value is attained, the drawing together of these two methodologies can be validated. The comparison of lean production to conventional production, and management of projects to conventional project management revealed two key ideas:

- Both methodologies address a similar problem for their field; that the existing methodology lacks comprehensiveness for contemporary production systems and construction projects respectively. Conventional production management which contends with inputs, outputs and conversions does not ensure efficient and effective production. Likewise, project management which focuses on time, cost and quality factors has poor control over the successful completion of the construction project.
- Both methodologies embody a comparable solution to the problems of the existing methodologies; augment the existing narrow methodology. Thus lean production incorporates flow and value as a concern for management in addition to their other tasks. The management of projects requires that project management embrace wider factors other than time, cost and quality in managing the construction project.

Thus it is argued that the lean production and the management of projects' methodologies bear similarity in terms of contending with similar problems and offering similar solutions to address those problems. It is on this ground that a connection is drawn between the two methodologies.

The lean project management methodology will utilise efficiency endeavours from lean production and effectiveness endeavours from the management of projects to enhance the performance of project management.

### **Development of lean project management methods and techniques**

There is now a need to develop new methods and techniques for project management under the lean project management methodology and this will form the basis for further research in this field. Methods and techniques attained from either lean production or management of projects will need to integrate under the new methodology. For those production-based techniques such as continuous improvement, etc., an accommodation will need to be made for the new project-based environment.

### **Conclusion**

An alternative methodology to project management has been presented and termed *lean project management*. This methodology is derived from the combining of lean production with management of projects. The approach contributes to project management performance by focusing on the effectiveness and efficiency of delivering value, ie. satisfying client needs.

This methodology utilises elements of both lean production and the management of projects. Lean production enhances the conventional production methodology by emphasising the efficient provision of value. It does this by introducing flow management and the management of value on an equal par to input, conversion, and output management. The

management of projects enhances conventional project management methodology by emphasising the effective provision of value. It does this by introducing wider factors for management such as environmental issues complementing time, cost and quality elements.

Lean production was combined with the management of projects given the proposition that their methodologies are congruent. Conventional production and conventional project management possess similar problems; that they lack the comprehensiveness to ensure adequate performance in contemporary applications. The two methodologies are also similar in their focus on improving management performance in relation to the attainment of value.

The proposition of lean project management represents the initial step in providing an approach to the developing of methods and techniques for project management which can contribute to improvements in its performance.

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