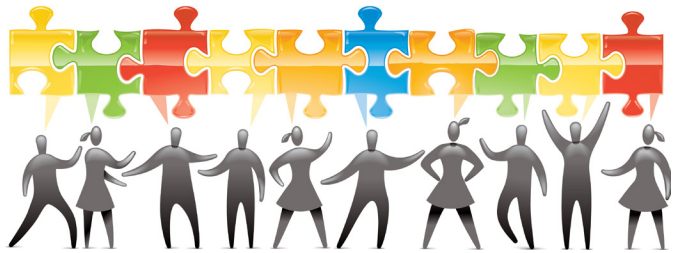
CHAPTER 4



LEAN CONSTRUCTION DEFINED

Introduction

Lean thinking has been applied with much success in many industries and service-provider organization. Lean concepts can be applied to any recurring effort at work, home or play. The construction industry recognizes it needs much improvement to keep pace with the ever-growing complexity of the built environment, and to make progress toward the same efficiency gains other business sectors have achieved. Many believe Lean Construction is the way.

Lean Construction extends from the objectives of a Lean production system—maximize value and minimize waste—to specific techniques, and applies them in a new project delivery process.

1.0 Why

Construction industry studies have shown 50% or more of the effort required to deliver a built environment is non-value added effort, or waste in the eyes of the customer (CII, 2004). The effectiveness of a labor hour has not improved in the last 50 years, while other industries have seen significant advancements (Teicholz, 2004). Demographics and labor shifts have significantly reduced the construction industry's labor availability, and the relative cost increases of the built environment are not satisfying the business needs of many of its customers.

2.0 How

Lean Construction is a respect- and relationship-oriented production management-based approach to project delivery–a new and transformational way to design and build capital facilities. Lean production management caused a revolution in manufacturing design, supply and assembly. Applied to the design, supply and construction of a capital facility, Lean changes the way work is done throughout the project-delivery process.

Lean Construction extends from the objectives of a Lean production system–maximize value and minimize waste–to specific techniques, and applies them in a new project delivery process. Therefore, Lean theory, principles and techniques, taken together, provide the foundation for a new form of project implementation. Building upon its roots in production management, Lean Construction produces significant improvements, particularly on complex, uncertain and quick projects.

3.0 What

Respect for People is the cornerstone of Lean thinking. People transform ideas and materials into final useful value. Respecting the contribution of each individual is necessary to tap this resource. In addition, 1) People are central to the success of Lean project delivery; and 2) The production management-based approach of Lean project delivery encourages all efforts to make transparent and then optimize all processes and flows within design and construction work.

Furthermore, by placing people at the center of Lean Construction, we are reminded to prioritize Respect for People and avoid generating the 8th waste, which can be summarized as "Unused/Underutilized Employee Talent/Creativity/Intellect/Skills/Potential" (Bicheno and Holweg, 2009).

Lean thinking encourages a constant reflection to determine if every expenditure of resource is employed to generate value. The customer should determine and make transparent that value definition via the project's *Conditions of Satisfaction*. to help guide the project team's efforts. Thus, generating value should efficiently transform raw materials into final products or services, and that process should be done right the first time.

Lean thinking encourages practitioners to look for and remove waste. Waste is effort or resource utilization that does not create value. This waste is not always obvious and requires effort to identify and then remove. All waste cannot be removed but an effort to minimize all waste is encouraged.

Lean thinking suggests that standardizing process and leveling flow are the best ways to optimize a value stream. Standardized practices can be repeated consistently and become a starting point for continuous improvement. Leveling workflow helps minimize variation to allow consistent output and predictable results.

Lean thinking demands a mindset of continuous Improvement. Leaders must create an environment where experimentation is encouraged and small manageable failure is acceptable if the goal is to improve continuously. This atmosphere can drive innovation that will benefit the entire value stream through value creation.

An overarching concept of Lean thinking is to optimize the whole. Value stream optimization encourages projects to look beyond the local and individual efforts and study the overall outcome to determine where value is added or waste is included in each step considering the value proposition. This concept is counterintuitive to those trained to specialize in one area and maximize that value. Traditional construction industry contracts force a siloed optimization for each individual firm to be successful. Lean thinking attempts to reverse that concept.

Project teams might also find it useful to customize the way they introduce/initially define changes in the application of Lean Construction based upon the composition of their audience.

For example:

Owner:

- Expects predictable/reliable delivery; that is, on time, on budget, and at the level of quality in a safe working environment expressed in the project's Conditions of Satisfaction.
- Requires actively engaged owner participation to continuously define the value proposition.
- Requires owner representatives to commit to making decisions, sharing the "why" with the partners, and fostering a fair, collaborative environment.
- Expects the owner to be an equally participative, accountable team member.

Design partner: (based upon the Lean principles outlined in *Lean Thinking* by Womack and Jones, 2003)

- Defines value from the customer's perspective and in their language.
- Organizes all value-adding work in a value stream.
- Makes the work flow in accordance with the needs of the next customer.
- Pulls work from a provider whenever possible.
- Pursues perfection; that is, "What can we do to make today better than yesterday?"

Build partner:

- Respects the expertise of the build partners and attempts to maximize their knowledge during design and project planning.
- Focuses on productivity and safety.
- Creates more productive trade partners because all constraints have been removed so they can complete work as planned. This minimizes their comebacks (that is, the need to demobilize and remobilize when work cannot be complete as planned), which negatively impacts productivity.
- Produces better safety results among trade partners because work can be completed as planned. When trade workers perform comeback work, they are potentially double- and triple-exposing themselves to unsafe work conditions.

People are at the center of Lean Construction. They collaborate within and across teams using foundational Lean principles with the goal of optimizing overall value.

Quick Reference

Learning to See Waste 23

Respect for People 77

Conditions of Satisfaction 133

For additional readings and information, please see the below information.

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Additional Readings

Implementing Integrated Project Delivery on Department of the Navy construction projects

Implementing Lean Construction Understanding and Action

Investigation into the nature of productivity gains observed during the Airplane Game lean simulation

KanBIM Workflow Management System Prototype Implementation and field testing

Last Planner and Integrated Project Delivery

Lean Construction - 2000 to 2006

Lean Construction as a Strategic Option Testing its Suitability and Acceptability in Sri Lanka

Lean Construction Practices and its Effects A Case Study at St Olav s Integrated Hospital, Norway

Lean Construction Prospects for the German construction industry

Lean Construction Where Are We And How To Proceed

Lean principles in industrialized housing production The need for a cultural change

Psychological foundations for incentives

The Combination of Last Planner System and Location-Based Management System

Why Isn't The UK Construction Industry Going Lean With Gusto