CHAPTER 31: Continuous Improvement (Kaizen Stairway)

Introduction

The construction industry has seen an erosion of efficiency with limited improvement compared to other industries over the past 50 years. The industry has created silos of various supply chain members, introducing significant waste to the system. Individual designers, craftsmen, managers, and suppliers have been isolated and directed to provide only what they have been told, and little has been asked of them outside the realm of their transactional contract obligation.

Integrated/collaborative projects are focusing on the elimination of waste as a means of driving improved value to the process. These teams invite all participants to contribute to the value proposition. Some contracts provide for the sharing of that value increase. Lean projects specifically focus on a process of Continuous Improvement.
1.0 Why

There is a belief held by many in the construction industry that improvement to the metaphorical “legs” of the time, cost, quality and safety “stool” cannot take place simultaneously. Instead, they believe that one should be sacrificed to improve the others. In other words, to improve the schedule and budget, one must sacrifice the overall quality of the work.

The Lean approach directly challenges this belief and encourages a project team to realize that all metrics can improve simultaneously. The Kaizen Stairway (Figure 1) provides a systematic framework to help Lean managers think more precisely about the specific steps needed to accomplish simultaneous, continuous improvement.

2.0 How

In order for improvement to take place, the current state should first be benchmarked. The team Value Stream Maps its current state and defines and collects metrics with respect to time, cost, quality, safety, and morale.

This process documents the current state performance and helps the team identify initial opportunities for the elimination of waste. A facilitator may then ask key team members to brainstorm Plus/Delta items (Figure 2). Delta items challenge the team to define specific problems that should be resolved in order for the project team to take its first step up the Continuous Improvement Stairway.

The facilitator can then engage relevant stakeholders to help populate the ribs of an Ishikawa Fishbone (cause and effect) Diagram (Figure 3). This helps the team graphically identify and capture possible causes that may be leading to an undesirable effect.

The key stakeholders then:

- Roughly quantify and rank causes on a Pareto Chart histogram (Figure 4) so it becomes clear that causes with the greatest impact on the desired outcome need to be tackled first.
- Identify critical causes and subject these to a “5 Whys” analysis process (Figure 5). This process of repeatedly asking “Why” assists team members with drilling down to a root cause so that any proposed countermeasure could permanently resolve a problem.
• Deploy critical countermeasures into a PDCA (Plan Do Check & Adjust) Cycle (Figure 6)—also called a “First Run Study”.

• Collect metrics to see whether or not the implemented root cause countermeasure results in the desired improvement.

If the deployed countermeasure results in the desired improvement, the process becomes standardized within the organization until it is clear that team members have a firm grasp on the improved work process, and the process can begin again. The Continuous Improvement cycles are iterative in the sense that every future state becomes a new current state, which then begins the search for the next future state.

The entire Continuous Improvement process should be performed within a culture of respect. This is important because the search for enhanced efficiency without the involvement of team members runs contrary to the cultural mindset necessary to deliver Lean results.

In the more detailed version of the Kaizen Stairway (Figure 7) there is an overlay of two gray bars that shows some of the observed outcomes if improvements are truly Lean. The upper gray bar represents what we would expect to observe on a line-of-balance schedule where a previously disjointed and conflicted schedule of activities starts to flow. The lower gray bar represents what we would expect to observe on a coordinate system, where the horizontal axis represents “cost” and the vertical access represents “importance to the owner”.

If the process improvements implemented truly offer improved value to the owner, we should observe a taller importance bar for the same amount of cost, the same sized importance bar for lower cost, or greater importance for less cost. Again, the team will know if their interventions are truly Lean because the five metrics of time, cost, quality, safety, and morale should benefit the overall project long-term (right vertical axis), and waste that was initially embedded in the system should become increasingly replaced with opportunities to generate value (lower horizontal axis).
Collective Kaizen and Standardization

Figure 1. The Kaizen Stairway


Figure 2. Plus-Delta (+/-Δ) Chart
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Figure 3. Ishikawa Fishbone (Cause and Effect) Diagram

Figure 4. Pareto Chart

Figure 5. Example of 5-Whys Root Cause Analysis – and drill down to arrive at “permanent” countermeasure.
Figure 6. The PDCA Cycle

Figure 7. The Kaizen Stairway, with Line-of-Balance flow schedules and Choosing by Advantages value graphs included.
3.0 What

The Continuous Improvement (Kaizen Stairway) process offers a holistic approach to resolving issues with Lean principles and tools.

By using various tools in sequence—the Plus/Delta chart, the Ishikawa Fishbone Diagram, the Pareto Chart, the “5 Whys” and the PDCA (Plan Do Check & Adjust) cycle—the Kaizen Stairway helps teams structure improvement to all key metrics, as waste is progressively excised and converted to value.

Quick Reference

Lean Construction Overview .................... 15
Value Stream Mapping ......................... 213
A3 Thinking ........................................ 223

For additional readings and information, please see the below information.
CHAPTER 31 – CONTINOUS IMPROVEMENT
Additional Readings

5.5 Digital Design-Emdanat

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A Project in Review-Owner Case Study-Message to the Facilities Team

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Contract Or Co-Operation Insights From Beyond Construction Collaboration - The Honda Experience

Contracting for Lean in Design Build

Developing the True North route map as a navigational compass in a construction project management organisation

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Five Big Ideas of Lean Construction

Generic Implementation of Lean Concepts in Simulation Models-1

High-Performance Building Green Rating Systems
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Implementing Pull Strategies in the AEC Industry

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

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Lean Construction - 2000 to 2006

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Lean Construction Where Are We And How To Proceed

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Reflections on Co-Location

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