

Integrating Lean Principles and Digital Technologies to Optimize the Pre-Construction Phase

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Abstract

Real estate project preferences in pre-construction exercises have significant impact on schedule and cost performances. Traditional pre-construction is document intensive and sequential leading to rework, delay and cost overruns. Lean construction focuses on removing these wastes by creating the greatest value by way of dependable processes and early partnership. In practice, the digital tools, in particular, Building Information Modeling (BIM), 4D/5D simulation, Common Data Environments (CDE), Last Planner System (LPS), Target Value Delivery (TVD), Advanced Work Packaging (AWP) and Design for Manufacture and Assembly (DfMA), have become some of the main facilitators of lean in pre-construction. Experience suggests that the cost of the BIM-facilitated projects becomes around 15-20 percent lower and the construction rhythm 20 percent quicker, whereas the rework can be reduced by approximately 49 percent with the help of clash detection. This article surveys the literature on the principles of lean and digital innovations in pre-construction, outlines the most popular tools to particular pre-construction operations, and provides market trends. It finds that the adoption of technology at pre-construction opens large savings in efficiency: research estimates indicate that the schedules can be shortened by 10-25 percent and costs reduced by 8-20 percent.

Keywords

Building Information Modeling, Common Data Environment, Last Planner System, Lean Construction.