



Adopt Lean or Agile to Improve the Performance of Construction Organizations?

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Introduction

Construction projects are historically plagued with delays, cost overruns, and quality issues. The pursuit of methods and techniques to reduce these problems is everlasting. In this mini-review, two techniques, which have been borrowed from other industries to improve the outcomes of construction projects, are discussed. The first principle is Lean project management from the manufacturing industry, which has been successfully adopted in many construction projects to minimize waste. The second principle is Agile project management, most frequently applied to the development of software to embrace the changing needs of clients and keep them engaged in the process. First, traditional project management is explained. Next, the principles of Lean and Agile management and their application in construction are demonstrated. Finally, a comparison is made between them to highlight their similarities, differences, and how they can be successfully applied in the construction industry.

Traditional Project Management

Construction projects are traditionally managed in a sequential manner, where each phase should be completely finished before proceeding to the next one (often referred to as the waterfall model). It is, thus, assumed that once a phase is completed, it will not be re-visited. Additionally, the schedule, which is prepared by a single planner is pushed on the project team as a document to be followed. However, any project encounters variations due to many

possible reasons, and most systems cannot function well when subjected to the combination of dependence and variation. Further, as the scope of the project increases, the number of activities that can interact also increases (Howell 1999) [1]. This can result in the occurrence of schedule overruns, budget problems, and a compromise in quality, among other issues.

Lean Concepts

Lean principles were first introduced in the manufacturing industry, with the goal of better serving the customer needs while minimizing waste in the production process (Howell, 1999) [1]. The most important principles are briefly discussed in Figure 1.

Lean in Construction

According to Garcés, et al. (2025) [2], Lean Construction practices have steadily grown to cover the entire project life cycle in both realms of the industry and academic research. Currently, its integration with technologies such as BIM (Building Information Modelling) is highly prioritized to optimize construction projects' outcomes. Nevertheless, lean thinking is based on a bottom-up decision-making approach, which may not be suitable for construction projects due to the time constraints, as it would take too long (Gao and Low, 2014) [3]. In addition, decisions should be made in coordination with the members who perform the most value-adding activities (i.e. workers) which cannot be easily implemented in the construction industry.



Figure 1: Learn Principles.

Agile Project Management

Agile was first discussed by William Royce in the 1970s for large software projects. It is a project management methodology that relies on short development cycles to manage complexity brought about by constant change rather than conforming to an early plan (Owen and Koskela, 2006) [4]. Moreover, agile methods require constant improvement of methods according to the lessons learned in previous cycles while staying connected to the client throughout the project life cycle.

Agile in Construction

The implementation of agile principles in construction projects may face some cultural barriers. For example, construction teams prefer to avoid contractual risks in their practices and tend to execute projects while disengaging from the client. Besides, some clients wouldn't be willing to work in such collaborative environments, and even if they do, co-location of all team members wouldn't be always possible. Therefore, Jurković, et al. (2024) [5] studied the incremental expanding of the agile culture within construction organizations by gradually involving more team members in agile practices.

Agile vs Lean

Even though agile and lean are fundamentally different, they have a very common aspect, which is the continuous learning process. Both approaches require teams to work in small quantities so they can work hard and learn from the continuous feedback. Many studies have examined the effects of both management approaches on construction projects' performance Badran and Abdallah (2024) [6], Brandl, et al. (2021) [7], Ju et al., 2020) [8]. According to Badr and Abdallah (2024) [6], lean practices have a significantly positive impact on cost performance, high efficiency, quality performance, and client satisfaction. On the other hand, agile practices result in highly positive impacts on innovation performance, responsiveness to various client needs, quality performance, and client satisfaction. Therefore, it is concluded that Lean Project Management is more

suited for companies that aspire to achieve high levels of efficiency and cost competitiveness, whereas Agile Project Management is better suited for organizations that prioritize responsiveness to clients' needs and innovation.

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Conflict of Interest

None.

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