

Integration of Last Planner System (LPS) and Primavera for Lean Construction Management in Residential Building Projects

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Abstract - The construction industry often faces challenges such as project delays, cost overruns, poor coordination, and workflow interruptions in residential building projects. This study focuses on the integration of the Last Planner System (LPS) with Primavera P6 to improve lean construction management and project performance. The research aims to develop an integrated framework that combines Primavera's scheduling capabilities with LPS principles such as look-ahead planning, weekly work planning, constraint analysis, and continuous monitoring. Comparative analysis of projects before and after integration showed improvements in planning reliability, coordination, productivity, and schedule performance. The integrated LPS-Primavera approach reduced workflow interruptions and enhanced overall project efficiency. The study concludes that integrating LPS with Primavera P6 provides an effective method for achieving lean construction objectives and improving the performance of residential building projects.

KeyWords:

Lean Construction, Last Planner System (LPS), Primavera P6, Residential Building Projects, Project Scheduling, Planning Reliability,

1. INTRODUCTION

The construction industry often faces challenges such as project delays, cost overruns, low productivity, and poor coordination, especially in residential building projects. Traditional planning methods mainly focus on long-term scheduling and frequently fail to ensure smooth workflow and reliable execution at the site level. To overcome these issues, lean construction principles have been widely adopted to improve efficiency and reduce waste in construction projects.

The Last Planner System (LPS) is an important lean construction tool that improves planning reliability through collaborative decision-making, look-ahead planning, and continuous monitoring. Similarly, Primavera P6 is widely used for project scheduling, resource management, and progress tracking. However, Primavera alone may not effectively address short-term workflow uncertainties during project execution.

This study focuses on integrating the Last Planner System with Primavera P6 to improve lean construction management in residential building projects. The integration aims to enhance coordination, planning reliability, productivity, and overall project performance by combining lean planning practices with advanced scheduling techniques.

2. Body of Paper

Integrating the Last Planner System with Primavera P6 can help overcome the limitations of conventional scheduling practices by combining lean planning principles with digital project management tools. Such integration improves communication, coordination, planning reliability, and project execution efficiency. Therefore, this study focuses on developing an integrated framework for implementing LPS within Primavera P6 for residential building projects and evaluating its effectiveness in improving project performance.

Conventional project management methods in construction mainly focus on scheduling and timeline control, but they often fail to address workflow uncertainties, leading to delays and productivity losses. Lean construction concepts, especially the Last Planner System (LPS), improve planning reliability through collaborative planning, look-ahead scheduling, and continuous monitoring. Studies show that LPS enhances communication, reduces workflow interruptions, and improves productivity.

Primavera P6 is widely used for scheduling, resource allocation, and project monitoring, but it has limited integration with field-level planning activities. Recent research suggests that integrating LPS with Primavera P6 can improve coordination, workflow reliability, and overall project performance. However, practical frameworks for such integration in residential building projects are still limited, creating the need for this study.

Research Methodology

The methodology adopted for this study includes literature review, questionnaire survey, project analysis, and framework development.

1 Literature Study

A detailed literature review was conducted to understand lean construction principles, the Last Planner System, Primavera

P6 scheduling practices, and previous studies related to lean project management integration.

2 Questionnaire Survey

A questionnaire survey was conducted among construction professionals including project managers, site engineers, planners, contractors, and consultants. The survey aimed to identify major issues in conventional planning methods and opportunities for implementing LPS with Primavera P6.

The collected responses were analyzed using statistical methods to determine the significance of different planning and coordination factors.

3 Project Selection

A residential building project was selected as the case study for evaluating the proposed integrated framework. The project schedule, resource allocation, and cost data were collected and analyzed using Primavera P6.

4 Development of Integrated Framework

An integrated framework was developed by incorporating LPS processes into Primavera P6 schedules. The framework included:

- Master scheduling
- Phase planning
- Look-ahead planning
- Weekly work planning
- Constraint analysis
- Progress monitoring
- Percent Plan Complete (PPC) analysis
- Continuous improvement practices

5 Comparative Analysis

The performance of the project before and after LPS integration was compared based on:

- Project duration
- Cost performance
- Workflow reliability
- Productivity
- Coordination efficiency
- Schedule performance indicators

Integration Framework of LPS and Primavera P6

The proposed integration framework combines the scheduling capabilities of Primavera P6 with the collaborative planning principles of the Last Planner System (LPS) to improve project performance in residential building projects. Initially, the overall master schedule was developed in Primavera P6 by identifying project activities, sequencing tasks, estimating durations, and allocating resources. The project was then divided into manageable phases such as foundation work, structural activities, masonry, plastering, finishing, and external works to ensure better planning and coordination among stakeholders.

Short-term look-ahead schedules were prepared to identify upcoming activities and potential constraints before execution. Factors such as material availability,

labor requirements, equipment allocation, and design-related issues were reviewed in advance to minimize workflow interruptions. Weekly work plans were prepared through collaborative meetings involving engineers, supervisors, subcontractors, and site personnel, where commitments were made based on actual site conditions and available resources.

Constraint analysis was carried out regularly to identify and resolve issues affecting project execution before the start of work activities. Continuous project monitoring was performed using Percent Plan Complete (PPC), schedule variance, cost variance, and earned value management indicators to evaluate planning reliability and project progress. Regular review meetings were also conducted to identify reasons for plan failures and implement corrective measures, thereby supporting continuous improvement and enhancing overall workflow reliability and project efficiency.

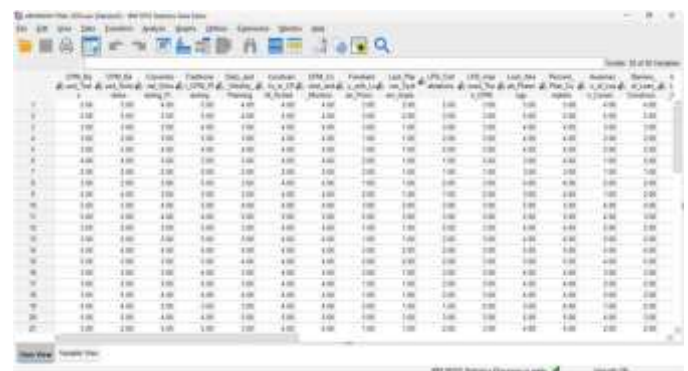


Fig 1: SPSS Analysis



Fig 2: Primavera schedule

The implementation of the Last Planner System (LPS) integrated with Primavera P6 showed significant improvements in project performance compared to conventional project management practices. Collaborative planning and improved communication among stakeholders enhanced planning reliability, making weekly work plans more realistic and achievable. Look-ahead planning and constraint analysis helped identify and resolve issues before execution, thereby reducing workflow interruptions, idle time, and construction delays.

The integrated framework also improved schedule performance through better coordination between site activities and master schedules, resulting in more efficient project execution. Labor productivity increased due to improved work sequencing, better resource availability, and enhanced coordination among construction teams. Although additional planning efforts were required during implementation, the overall project performance improved because of reduced rework, fewer delays, and more effective resource utilization. Regular collaborative meetings further strengthened communication and decision-making among project participants. Overall, the study findings confirm that integrating the Last Planner System with Primavera P6 improves planning reliability, workflow continuity, productivity, and overall project efficiency in residential building projects.



Fig 3: Primavera baseline Charts

3. CONCLUSIONS

This study examined the integration of the Last Planner System with Primavera P6 for lean construction management in residential building projects. The research identified major limitations of conventional project management practices and developed an integrated framework that combines lean planning principles with advanced scheduling techniques.

The implementation of the LPS–Primavera integrated framework improved planning reliability, workflow continuity, stakeholder coordination, and project monitoring. The use of look-ahead planning, weekly work planning, and continuous performance monitoring significantly reduced workflow interruptions and improved schedule performance.

The comparative analysis demonstrated that the integrated approach enhances project productivity and supports better decision-making during construction execution. The findings indicate that integrating LPS with Primavera P6 provides an effective solution for achieving lean construction objectives and improving overall project performance in residential building projects.

The developed framework can be adopted by construction organizations to improve project

predictability, reduce waste, and enhance operational efficiency through collaborative planning practices.

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