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THE EFFECTIVENESS OF LAST PLANNER SYSTEM (LPS) IN INFRASTRUCTURE PROJECT MANAGEMENT

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ABSTRACT

The Last Planner System (LPS) is a highly effective project management methodology widely used in infrastructure projects to enhance coordination, schedule adherence, and cost control. LPS focuses on the identification and resolution of constraints before activity execution, allowing teams to adapt quickly to unforeseen events and ensuring smoother workflow with fewer disruptions. This approach emphasizes collaborative planning, where all stakeholders are actively involved in the planning and decision-making process, promoting communication and improving the overall project execution. Additionally, integrating LPS with other tools, such as Building Information Modeling (BIM), provides further optimization, creating synergy between the methodologies to reduce waste and foster continuous improvement in the construction process. Studies across various infrastructure projects, such as the Pan-American Games facilities, highways, bridges, and dam projects, demonstrate the adaptability and positive impact of LPS in different contexts. Evidence shows that LPS not only resolves common issues like delays and excessive costs but also contributes to enhanced quality and better collaboration among project participants. The methodology's collaborative nature allows for more effective planning, leading to organized and efficient workflows, and ensuring projects are completed on time and within the specified budget. By focusing on resolving constraints early and promoting team involvement, LPS fosters a productive and organized environment essential for success in the construction sector. This approach plays a key role in delivering high-quality infrastructure projects while maintaining cost-effectiveness and timely completion.

Keywords: Last Planner System. Infrastructure Projects. Collaborative Planning. Building Information Modeling. Project Management Efficiency.

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INTRODUCTION

The Last Planner System (LPS) is a methodology for planning and controlling construction projects, particularly designed to improve efficiency, collaboration, and overall performance. Initially developed for the construction industry, LPS focuses on involving all stakeholders in both the planning and execution phases, fostering continuous communication between teams and enabling more effective decision-making. The system is particularly advantageous in large-scale and complex projects, such as infrastructure developments, where coordination between multiple disciplines and stakeholders is critical.

Unlike traditional project management approaches that rely on fixed schedules, LPS emphasizes the identification and management of constraints that may impede the smooth execution of tasks. By addressing these constraints proactively, LPS allows for a more flexible approach to project planning, reducing the likelihood of disruptions and delays. The system is implemented through a series of collaborative steps, including long-term planning, weekly reviews, and daily follow-up meetings, which enable all team members—from managers to field workers—to contribute to the project's success.

When applied to infrastructure projects such as highway construction, bridge building, and sewage system installation, LPS proves invaluable in addressing the inherent complexity of these undertakings. These projects often involve various disciplines and require careful coordination to manage dependencies and unexpected issues. LPS allows project managers to gain a clearer understanding of the project's progress, anticipate potential obstacles, and allocate resources more efficiently, ensuring that the project stays on track both in terms of budget and schedule.

Moreover, adopting LPS in infrastructure projects enhances predictability and control, particularly in the face of uncertainties such as adverse weather conditions or regulatory changes. The system fosters a collaborative work environment, where every participant plays an active role in achieving the project's objectives. By using LPS, project managers can enhance the efficiency, reduce costs, and improve the quality of infrastructure projects, making it a powerful tool for the construction industry.

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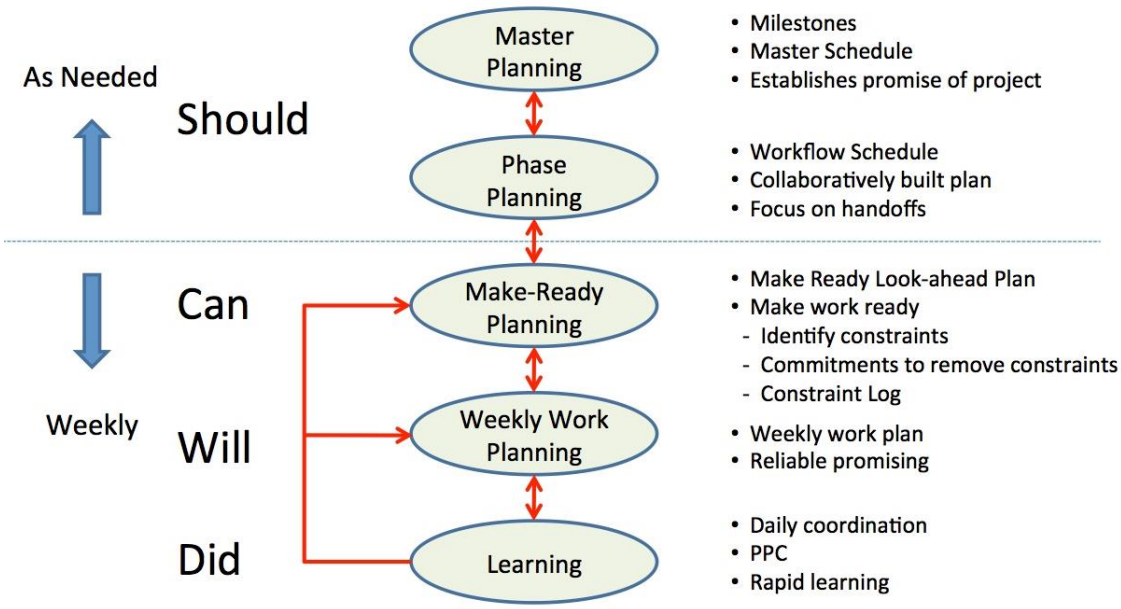
Figure 1: Last Planner System.



Source: Lean Construction Blog.

A notable study by Heigermoser et al. (2019) explores the integration of Lean Construction principles and Building Information Modeling (BIM) to further enhance the effectiveness of the LPS. Lean Construction focuses on minimizing waste and maximizing value, while BIM offers a 3D visualization tool that allows for detailed project modeling. The research highlights how combining LPS with BIM can improve short-term planning, reduce construction waste, and provide a more comprehensive view of the project. The authors propose a construction management tool that merges these two methodologies, offering a system that automates the quantity take-off, divides projects into work zones, and provides a 4D simulation to facilitate project analysis. This integration of Lean and BIM enhances productivity, promotes continuous improvement, and reduces inefficiencies, providing a more effective approach to construction management.

In another study, Kassab, Young, and Lædre (2020) investigated the implementation of LPS in an infrastructure project—the Minnevika Bridge project. While numerous studies have examined the use of LPS in general construction projects, few have focused on its application to infrastructure projects. This research identifies common challenges encountered during the implementation of LPS, such as resistance from project participants. By employing a variety of data collection methods, including observations, interviews, and surveys, the study found that the Minnevika Bridge project followed the best practices for LPS implementation. However, the study also revealed additional challenges not widely discussed in existing literature, such as the fear of responsibility when making commitments. The

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researchers suggested overcoming these challenges through sufficient training and fostering a more open attitude toward the system.

The implementation of LPS in infrastructure projects was also studied by Erazo-Rondinel, Vila-Comun, and Alva (2020) in the context of a major sports infrastructure project in Peru for the Pan-American Games. The study focused on the MEP (Mechanical, Electrical, and Plumbing) phase and the finishing works, which are often subject to delays and coordination issues. Over a 27-week period, subcontractors were introduced to LPS, learning its principles and applying them to improve coordination. This phase of the project revealed significant improvements in the project's planning process, as evidenced by a higher Percentage of Complete Plan and an improved Schedule Performance Index (SPI), ultimately allowing the project to be delivered on time.

Similarly, Sánchez et al. (2021) examined how LPS could mitigate delays in road infrastructure projects. Through a detailed analysis of 10 road projects, the study highlighted the common causes of delays, such as financial difficulties, material shortages, and lack of experience among contractors. The research found that LPS helps to reduce these delays by enhancing communication, improving the scheduling process, and identifying potential problems earlier in the project lifecycle. The study confirmed that the implementation of LPS significantly reduces delays, ensuring timely project completion.

In Addis Ababa, Limenih, Demisse, and Haile (2022) explored the implementation of LPS in road construction projects, particularly focusing on overcoming delays and budget issues. The study employed both qualitative and quantitative data collection methods, including surveys, observations, and interviews, to examine the current construction management practices in the city. The findings revealed that the existing practices, relying on push planning systems and critical path methods, were inadequate for ensuring timely project completion. By implementing LPS, the study found significant improvements in the management process, including better time, cost, and quality control.

Lastly, the study by Kussumardianadewi, Husin, and Susianti (2024) focused on applying LPS to dam construction projects in Indonesia. Faced with challenges such as time delays and limited water storage capacity, the research demonstrated how LPS could improve project planning, enhance productivity, and reduce accidents. Through the analysis of key success factors, the study found that effective budgeting, clear work plans, and weekly schedules were critical to the successful implementation of LPS in dam projects. These findings emphasized the importance of LPS in improving the overall management and delivery of infrastructure projects, particularly those with significant delays or challenges.

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In conclusion, the implementation of the Last Planner System (LPS) has proven to be a highly effective approach in infrastructure project management, providing significant improvements in coordination, meeting deadlines, and cost control. The methodology, by focusing on identifying and resolving constraints before the execution of activities, allows project teams to quickly adapt to unforeseen events, ensuring that work flows more efficiently with fewer disruptions. Furthermore, integrating LPS with other tools, such as Building Information Modeling (BIM), can further optimize planning and execution, creating synergy between the methodologies to minimize waste and promote continuous improvement in the construction process.

Therefore, the studies conducted in various contexts and project types, such as infrastructure for the Pan-American Games, highways, bridges, and even dam projects, demonstrate the adaptability and benefits of LPS in different scenarios. The evidence reveals that adopting this approach not only addresses typical problems of delays and excessive costs but also improves the quality of work and collaboration among project participants. By focusing on collaborative planning, the application of LPS contributes to a more efficient and organized work environment, enabling projects to be delivered on time and within the established budget, which is crucial for success in the infrastructure construction sector.

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