

# Application of Lean Construction Techniques in Civil Engineering: Plucking the low hanging fruit

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**Abstract** - Diminishing the time from start to conveyance by taking out the wellspring of waste in the work process is one of the fundamental ideas of lean endeavor. In development, lean methods are utilized to decrease waste and increment usefulness. Lean venture is to accomplish proprietor assumptions using irrefutably the base measure of man, machine, and material. This is accomplished by constant pursuit, recognizable proof and end of waste through a methodical methodology that depends in group reconciliation and compelling correspondence. Inappropriate data and correspondence process in the development business prompts change orders, improve, diminished constructability, cost overwhelms, and delays, making it probably the greatest reason for squander, particularly in the public area. The metropolitan development projects are one of the areas where improvement is especially required due to the incessant contrariness and inconsistency between the plan data gave and the real site conditions, particularly for the improvement and redesign projects in the old metropolitan regions. To work on these tasks, the idea of lean procedures offers new knowledge into the elements of development and gives an unmistakable vision of what these activities are attempting to accomplish with respect to the effect of the work technique administering these undertakings

**Key Words:** Enterprise, lean

## 1.INTRODUCTION

Construction Management and innovation are the two key factors impacting the improvement of the development business. Throughout the course of recent years, albeit a few new and trend setting innovations have been applied to development projects, the productivity of the business has remained very low. Lean execution starts with authority responsibility and is supported with a culture of nonstop improvement. Whenever the standards are applied appropriately, emotional upgrades in security, quality, and proficiency can be accomplished at the venture level. Enhancements at the interaction and undertaking levels are empowering influences that make upgrades at the venture level more effective and permit such upgrades to be reasonable.

## 1.1 Tools

1. **Computer Aided Design:** Computer aided design is a complex process. There are many specialized tools that can speed up your design, minimize errors and improve your results.
2. **Safety Improvement Programs:** Safety and association of a building site were improved with the utilization of wellbeing proactive factors and a 5-S program evaluation apparatus (Sort, Set in Order, Shine, Standardize, Sustain) on a project managed on Lean principles.
3. **Visual Inspection:** Visual Inspection is the strategy for Visually Inspecting the works and the mistakes that are happening nearby. A visual auditor should foster a system by which the person will review a projecting.
4. **Continuous Improvement Programs:** Constant improvement is a strategy for distinguishing amazing open doors for smoothing out work and diminishing waste. The training was formalized by the ubiquity of Lean/Agile/Kaizen in assembling and business, and it is currently being utilized by great many organizations all around the world to distinguish reserve funds open doors. A large number of these philosophies can be joined for astounding outcomes.



Fig -1: Basic concept of Lean Construction Technique

5. Last Planner system: Last Planner research started with an attention on working on the nature of Construction. Last Planner research started with an emphasis on working on the nature of added a lookahead interaction to shape and control work process and in the end was reached out from development to plan.
6. 5S Process: 5S is a framework to lessen squander and streamline usefulness through keeping a deliberate working environment and utilizing viewable prompts to accomplish more predictable functional outcomes. Execution of this strategy "tidies up" and sorts out the working environment essentially in its current design, and it is regularly the main lean technique which associations carry out.
7. Value Stream Mapping: Value stream mapping, a lean assembling device, which started from the TPS, is known as "material and data stream planning." This planning apparatus utilizes the procedures of lean assembling to investigate and assess specific work processes in an assembling activity.
8. Kaizen: Kaizen implies improvement, nonstop improvement including everybody in the association from top administration, to directors then to bosses, and to laborers.
9. Plan Do Check Act: The planning phase involves assessing a current process, or a new process, and figuring out how it can be improved upon. The do phase allows the plan from the previous step to be enacted. During the check phase, the data and results gathered from the do phase are evaluated. If the check phase shows that the plan phase which was implemented in do phase is an improvement to the prior standard (baseline), then that becomes the new standard for how the organization should act going forward.

### 1.2 Objectives

To figure out the degree of worry about lean development techniques.

To research the variables influencing the execution of development projects.

To analyze the effect of carrying out appropriate lean device on a building site.

## 2. LITERATURE REVIEW

The expression "LEAN" began from the Toyota Production System (TPS) created during the 1990s. It depicts the technique that the organization embraced to improve creation and utilization started from the Toyota Production System (TPS) created during the 1990s. It depicts the system that the organization embraced to upgrade creation and utilization proficiency of its auto labor and products (Ahrens, 2006; Howell and Ballard, 1998; Womack and Jones, 2003). The idea of lean has its establishment in the organization of reproducible exercises by Fredrick Winslow (Taylor's hypothesis) and its best verifiable execution depended on Henry Ford's transport line development that prompted large scale manufacturing saw in the nineteenth century (Vieira and Cachadinha, 2011). A significant change in the way of thinking of assembling then happened in Japan in 1949 when Toyota deals dwindled constraining them to conserve numerous their laborers after the organization's assessment showed that Taylor's large-scale manufacturing was deficient and subsequently must be evaluated and overhauled (Ahrens, 2006). This prompted the presentation of the Toyota Production System (TPS), which brought about the foundation of lean creation during the 1990s. The Toyota Production System was applied along with Total Quality Control (TQC) and was intended to diminish waste and reasons for assembling deserts (Anvari, Ismail and Hojjati, 2011). A similar idea has been embraced in the western world with the term 'lean reasoning' (Womack and Jones, 1996). Besides, the development and assembling enterprises have acquired it, thus the expressions "lean development" and "lean assembling" separately.

## 3. METHODOLOGY

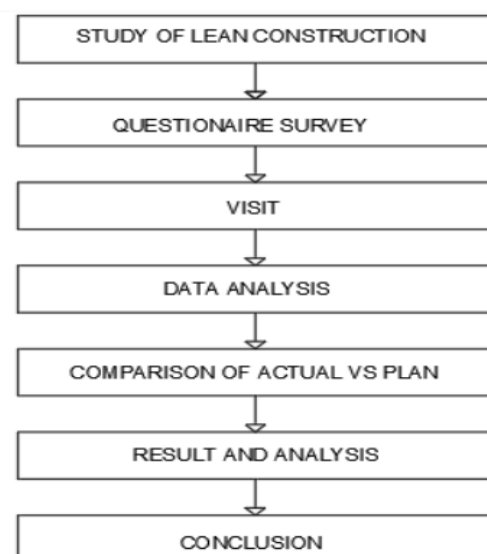
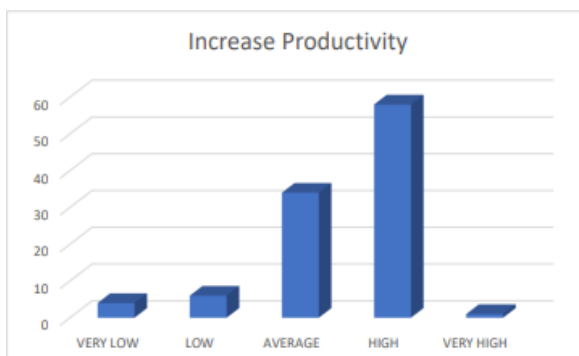


Fig -2: Methodology

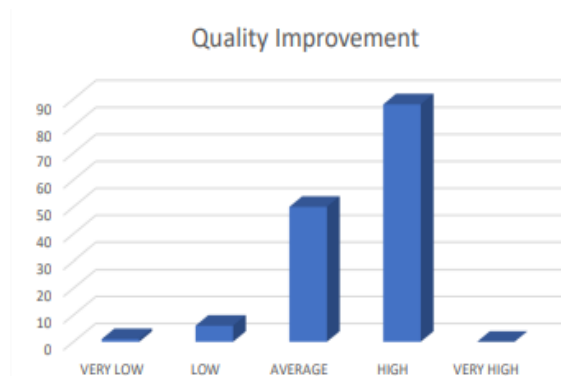
- 1. Study of Lean Construction Techniques;** As our study suggests some new and innovative methods to minimize waste and maximize the productivity. We gathered a huge source of Information from reading some old research works, visiting nearby sites and finding out ways to maximizing time constraints and reasons behind it, and reading a lot of work on internet.
- 2. Questionnaire Survey;** We basically formed a simple questionnaire to identify the sources of delays in Construction and factors affecting productivity of Construction Project. We nearly visited 100 Construction sites to collect data and analyze it to find some modern solutions by analyzing and processing some data.
- 3. Data Analysis:** After the Questionnaire survey, data collected & was analyzed using MS Excel. Following are some of charts as by-products of analysis part are attached below.

#### 4. BENIFITS OF LEAN CONSTRUCTION

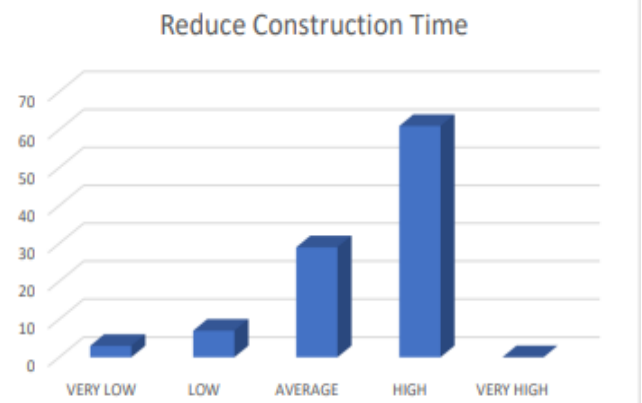
##### 4.1 Increase Productivity



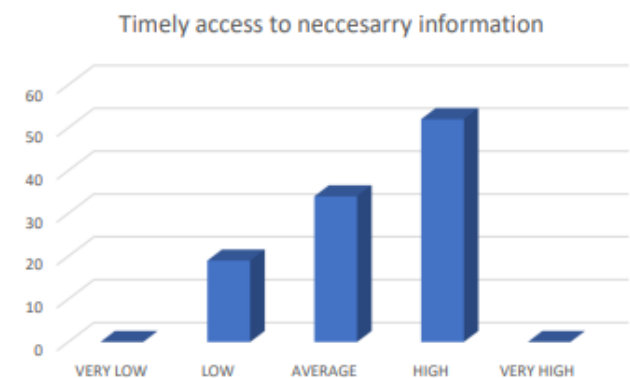
##### 4.2 Quality Improvement



##### 4.3 Reduce Construction Time



##### 4.4 Timely access to Necessary Information



##### 4.5 Employee Satisfaction



#### 5. CONCLUSIONS

- Lean reasoning was demonstrated in the Japanese auto industry and has humble built-up momentum in the development business, as proven by the rising volume of papers.

2. Incorporating booking and incline instruments can accomplish a look forward plan and a get procedure through an appropriate timetable. Thus, changing over the progression of assets from hindered to continuous with inactive and holding up time subsequently diminished.
3. Waste in the development interaction were characterized and detached as a controllable waste where it was arranged, perceived, and controlled.
4. Many options of lean strategies were distinguished to help in arriving at the ideal objective of waste decrease and execution and efficiency improvement.
5. The review results obviously evaluated the significance of the waste factors and lean methods options to assist decisionmakers with making tradeoffs among them.

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### REFERENCES

- [1] L. Koskela, Application of the New Production Philosophy to Construction, CIFE Technical Report 72, Stanford University, 1992.
- [2] G. Ballard, The last planner, In: Spring Conference of the Northern California, Construction, 1994
- [3] PMBOK, A Guide to the Project Management Body of Knowledge, fourth ed., Project Management Institute, Inc., Pennsylvania, USA, 2008
- [4] G. Ballard, G. Howell, an update on last planner, in: IGLC-11, Proceeding of the 11th Annual Conference of the International Group for Lean Construction, Blacksburg, 2003
- [5] L. Koskela, P. Lahdenperä, V. Tanhuanpää, Sounding the potential of lean construction: a case study, in: Proceedings of the 4th Annual Conference of the International Group for Lean Construction. Birmingham, UK, 1996