

## USE OF LEAN CONSTRUCTION TECHNIQUE FOR WASTE CONTROL AT CONSTRUCTION SITE

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**ABSTRACT - Lean construction is a technique of Project management. It helps to bring the changes in construction industry. Purpose of this method is to decrease the wastage of material on the site and reduce the duration of the project. Study helps us to understand the lean concept. Objective of paper is to study about the lean methods like Production Display Method, Relative Importance Index, Visual Management Production and Last Planner System.**

**Keywords: Lean construction, Project management, Duration, Material, Relative Importance Index.**

### I. INTRODUCTION

Lean construction is a "way to design the system to decrease waste of materials, time, and effort to regulate the utmost possible quantity of value". Second largest industry in India is construction industry.10% in GDP contribution is of construction industry in India<sup>13</sup>. Reducing the time from start to delivery by eliminating the source of waste in the work flow is one of the basic purposes of lean enterprise<sup>4</sup>. Lean technique is used for achieving the owner's anticipation by the use of the proper amount man, machine, and material. Because of improper information and unnecessary communication process in the construction field it leads to delay and increase in the cost of project, causing failure of the project<sup>6</sup>. To have improvements in the construction projects the concept of lean offers new view in the dynamics of the innovations and also provides a proper and clear vision of what the construction projects are trying to achieve in regards to have the impact of the work in this method for governing these construction projects<sup>2</sup>. Some of the lean techniques are also used for revealing the root cause for waste and increase of time in construction work. Six sigma, TQM & SPC have all established their way in this lean technique. Lean technique is best technique to lessen the wastage of materials and also time required for construction projects<sup>3</sup>.In India accessibility of skilled labors is major problem. Poor workmanship and unskilled labors leads to wastage in construction. To avoid such problems in

construction, ground-breaking techniques should be adopted. Lean technique is the best technique for the above problems. Ever since construction industry plays a vital responsibility in economic richness of the nation and numerous other industries depends on this field; by reducing the waste in the industry that would lead to a great cost savings for the industry. The implementation of lean techniques is related to the enhancement of performance and efficiency in the construction field<sup>6</sup>.Waste does not progress the value: it only increases the expenditure at the same time decreasing the quality, productivity and satisfaction of the project owner. The main intention of the lean technique is to uncover the waste in each practice and segregate them. To prevent unnecessary Transport: unnecessary movement of tool and products which are not necessary to support the production. Extern step taken by people, automobiles etc decreases the efficiency of any project. Over processing, handling the same work twice by two different people, added extra communication. To avoid such things there is the requirement of application of lean principles<sup>7</sup>.

### Fundamental Principles of Lean are<sup>1</sup>

1. Value should be defined through customer's perspective.
2. To ensure smooth flow in construction activities.
3. Reduction in wastage of construction materials.
4. To have proper time distribution to reduce unnecessary time wastage for completion of project.

### Activity Classification:

In lean construction the activities are classified as below:

1. Non-Value Adding: Activities which are measured to be pure waste .These activities must be eliminated.
2. Necessary but Non-Value Adding: Activities which engage operations that may be waste yet are necessary within the operating procedures.
3. Value Adding Activities which include the change or transforming of raw materials or semi-finished products to finished products or people which are moving

unnecessarily or being idle, and these are considered to be operational waste.

## II. LITERATURE REVIEW

The research explained the difference between construction methods in India and U.S.A and implementation of lean practices. The paper defines that wastage is classified into major parts that is Material, Quality, Labor, and Equipment. Author says that combined implementation of Lean principles and six sigma will give better results in the field of architecture and construction. Author defines the Last Planner system<sup>9</sup>, six sigma. The study says that 57% of work done during the construction is non value added and only 10% is value added and the remaining 33% is supporting activity. It helps us to understand the benefits of implementing the lean. The questionnaire survey was done between the various professionals of India and U.S.A. From the survey author concluded that 60% of respondents from U.S.A were aware of Lean construction which only 38% of respondents from India knew about it. Lean methods have not yet been practiced in India because of lack of information[12].

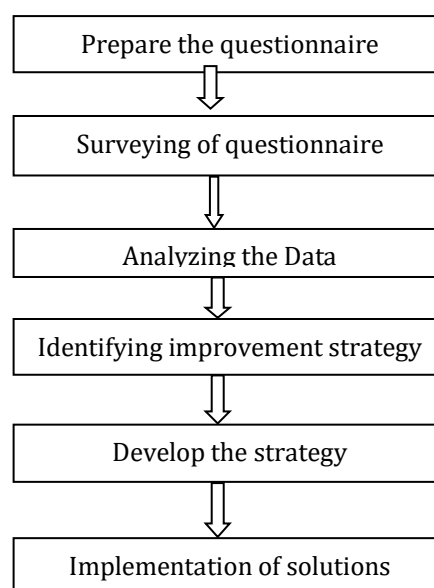
It is the paper consisting the case study of a project in Fortaleza, Brazil. The lean construction method was adopted by the engineer of this project after the completion of 1 year duration of the project. The project included construction of 1534 apartments. The lean practices involved in the project were Production System Design, Last Planner system and Visual management<sup>5</sup>. In production system design the first step undertaken was to create the relationship between the activities, study the flow of work and was also to prepare the plan. In Last planning system the planning for twelve weeks was done, list was prepared naming all the constraints faced by the project. Another plan was adopted to prepare the weekly plan and conduct the weekly meeting and also to note percentage of completion of work with quality and safety. In visual management the observation was done to know the team performance and form the line of balance. These methods were used to maintain the quality and safety. Lots of improvements were seen in this project due to implementation of lean concepts. Lean practices increased the quality and safety of project and also reduced the duration. Visual management method increased the transparency of the project, due to this company could build good relation with the contractor. The difficulties faced by the company to implement the lean methods was to make the crewmen, foramen, field employees to realize the importance of the method and make the understand planning the program. Due to this problem introducing new lean concepts was restricted. This paper gives the knowledge of implementing the lean concept in the large project.[5]

Author explained the various causes and sources of material waste on construction site. It's a study to reduce the waste and to understand the problems faced to adapt the lean method in any project. Author has implemented a tool Relative Importance Index<sup>1</sup> to understand the cause and effect of wastage at construction Industry. Author concluded that RII is a methodology to detect the waste in construction Industry [1].

In this research paper authors have discussed challenges in implementation of lean concept in construction industry in India. In this due to lack of attention and illiteracy towards lean management principle, contractors, Engineering and project management firms etc. are still in process for adopting this principle for construction project. In this paper efforts are made to find out barriers<sup>10</sup> through questionnaire survey and actual site implementations are made to develop a process map for ongoing project[13].

## III. METHODOLOGY

From the literature study the methods adopted in lean construction are Last planner system, Visual Management, Production Display System and Relative Importance Index. From all the above RII is the method well adopted due to its feasibility.



**Fig No: 1 Flow Chart of steps in RII method**

## IV. LITERATURE CONCLUSION

This method gives the basic knowledge of lean method. In this research paper we have analyzed how lean construction tools can be used to improve the implementation of these activities particularly in managing time and wastage of material in construction industry. RII is best suitable method among PDS, LPS, and VM.

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