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Implementation of Lean Construction Technique

Archana Pate[1]* A. R. Vasatkar[2]

[1,2] TSSM BSCOER Narhe

Abstract – A number of problems affecting productivity can be noted when the activities in progress on a typical construction site are closely observed. Productivity improvements give higher cost savings with minimal investment. Lean construction is relatively a new construction management philosophy which has evolved from Lean Manufacturing principles. Lean construction along with its various tools like Pull Approach, Just in Time (JIT), The Last Planner System (LPS), Total Quality Management (TQM), Work Sampling (WS)and Value Stream Mapping (VSM) etc. has gathered a lot of momentum in the developed nations. The challenge now lies in implementing it in the developing countries. The main purpose of Lean construction is efficiency improvement by elimination of non-value adding activities (Waste). The aim of the project is to implement the Lean construction tools in an ongoing construction project at Rahatani, Pune to identify wastes in construction activities and improve the process flow by eliminating wasteful activities.

Keywords: Lean Construction Tools, Productivity, Construction Management

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INTRODUCTION

Construction is the key sector for the national economy for countries all around the world, as traditionally it took up a big portion in nation's total employment. However, until today, construction industries are still facing numbers of problems that were bounded to be resolved since the past time. The major problems in the construction industry are well known such as Low Productivity, Poor Safety, Inferior working conditions etc.

Nowadays, increasing foreign competitions, the scarcity of skilled labour and the need to improve construction quality are the challenges faced by the construction industry. To respond those challenges it is essential to raise productivity, quality and incorporate new technologies to the industry.

With the lean construction paradigm, construction industry had started to be reviewed and evaluated the possibilities of implementing these new lean perspectives of production concepts in the construction process to optimize the overall construction performance on construction stage as well as design stage. Performance Improvement opportunities in construction can then be addressed by adopting waste identification/reduction strategies in the flow processes in parallel with the value adding strategies with the introduction of new management tools and with proper training and education programs. Unfortunately, these new lean construction concepts especially those on wastes and values most of the times are not well understood by construction personnel.

LITERATURE REVIEW

Lean Construction is a concept that needs to be introduced within the construction industry, to increase the productivity level through the elimination of activities and actions deemed to generate waste in the construction process.This chapter reviews literature on material waste, materials waste minimization strategies and lean construction tools.

Eiji Toyoda and TaiichiOhno pioneered the concept of lean production at the Toyota Motor Company in Toyota City, Japan around 1950s after the World War II. Lean production quickly became the strength of the Japanese motor-vehicle industry because it was able to eliminate waste: half of the resources, half of the manufacturing space, half of the investment tools, half of the engineering hours, and half of the new product development time than that of mass production.

Lean production caused Toyota to gain market share and revitalize the automotive industry. This revitalization and increased market share caused other automobile manufacturers around the world to become interested in Toyota's methods. They wanted to learn their techniques, thus, the International Motor Vehicle Programme (IMVP) at Massachusetts Institute of Technology (MIT) was created in 1985 and the research and learning of the fundamentals of lean production techniques began.

Lean principles incorporate teamwork, communication, efficient use of resources, elimination of waste, and stressed the importance of continuous improvement.

Vinaya D. More, Dr.ShrikantCharhate andMadhulikaSinha[1], in their paper presented main barriers towards the implementation of lean techniques in Indian construction industry with thehelp of questionnaire survey and actual site implementations are made todevelop a process map for ongoing project.From the study it can be concluded that there are generous reduction in durations (total no. of days) after applying lean tools i.e. around 25% reduction in project duration and 13% reduction in process activities.

Daily Progress Report – A Lean Construction tool

As in many developing economies, productivity is an issue of particular importance all over the world. This is considered as one of the strategic goals to carry out for each country's development cycle further than the post-conflict situation. There is a lack of sufficient research on construction productivity in several countries, but going by the example of other countries it can be assumed that any effort directed to improving productivity will greatly enhance the country's chances of realizing its strategic development goals, that's through studying , searching , determining the factors affecting it.

Productivity is defined as a ratio between an output value and an input value used to produce the output. Output consists of products or services and input consists of materials, labour, capital, energy, etc. There is nothing as dangerous to an economy as a decrease in productivities because it creates inflationary pressure, social conflict, and mutual suspicion.

Labour productivity has been defined in literature as the ratio of the output quantities to the input work hours, or as ratio of the work hours to the quantities. For the purpose of this study, the former definition is adopted and labour productivity is expressed as follows:

$$Productivity = \frac{Quantity\ of\ work\ achieved}{No.of\ Resources\ required}$$

2.8.3 Understanding of Productivity:

The term of "productivity" is used to donate a relationship between the output and associated input used in the production process. The simplest definition of productivity is the Ratio of output of goods and / or services to inputs of basic resources, e.g., Labour, capital, technology, materials and / or energy. The expression of productivity is calculated by using the following equation:

$$Productivity = Output / Input$$

It is apparent from this mathematical formula that increasing Output under the same amount of Input or decreasing Inputs, while keeping the original volume of outputs, can increase productivity. In the construction industry, the reduction of man-hours in the completion of a unit of work is an example of increasing productivity by decreasing inputs. Productivity of a construction operation is defined as the output of system per unit of time.

Productivity is the work hours during a specified time frame divided by the quantities installed during the same time frame. The time frame can be found daily, weekly, or at the end of entire Project (cumulative). This measure is commonly called the unit rate.

In another study, productivity is considered as a measurement dimension that sufficiently describes an operators` performance. The productivity in this context represents the quantity produced per operator hour and the number of work cycles performed per operator minute. To judge the level of performance, the actual productivity must be compared with a desired productivity (estimated).

The main outcome from the literature is that there is no standard definition of productivity. This study provides guidelines for necessary steps required to improve construction labour productivity.

Measures to overcome potential barriers to implementation of Lean Construction:

NO.	MEASURES
1	Management should train employees on lean concepts
2	Communication should be improved among players in construction projects
4	Construction managers should be committed to changes
5	Workers should be able to work in teams
7	Timely delivery of materials to construction sites
8	Firms should understand client needs and expectations and position themselves accordingly
9	Companies should be more client focused
10	Standardized construction elements should be promoted in the industry
11	Firms should be willing to change organizational cultures that do not promote lean construction
12	The opinion of employees should be considered in decision making
13	Management should deal with uncertainties and fears that cause organizations to conceal information instead of sharing it
14	Partnering should be promoted to maximize team building and development of trust
15	Team members should be empowered in decision-making to make partnerships meaningful

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Corresponding Author

Archana Pate*

TSSM BSCOER Narhe