

Elimination of Wastage using 5's Tools in Construction

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ABSTRACT

This paper gives overall idea about the Lean tools implementation for ongoing construction project to betterment of the work environment, to overcome productivity related analysis with checking consistency of productivity and continuous improvement through Kaizen implementation. The method adopted in this paper considers the main principle of lean construction and tools application during the construction execution process. We implemented tour based work sampling, 5S through trainings followed by regular audits and value addition through Kaizen during the construction phase. The paper explains effect and outcomes of implementing lean tools on construction project. Implementing lean tools, we are witnessing improvements in productivity of particular activity after removal of NVA flaws to streamline the overall process. Secondly, better work environment through 5S and Kaizen implementation. This paper demonstrates the implementation of lean philosophy through layout modification.

Keyword :- Lean Construction, Work Sampling, 5S, Productivity, VSM (value stream mapping), Kaizen.

INTRODUCTION

The 5S method begins each programme of improvement. It is the tool for helping the analysis of processes running on the workplace. The 5S is the methodology of creation and maintaining well organized, clean, high effective and high quality workplace. Its result is the effective organization of the workplace, reduction of work's environment, elimination of losses connected with failures and breaks, improvement of the quality and safety of work.

5s is the list of five Japanese words: seiri, seiton, seiso, seiketsu and shitsuke. 5s is a workplace organization technique. it helps create and maintain the efficiency and effectiveness of a work area. it helps in increase in productivity. Improving productivity in construction is a great challenge facing the construction industry. Achieving smooth work flow with minimal waste requires not only appropriate construction planning, but also effective production management. Improving safety in construction remains a priority in almost every country around the world, because the construction industry stands out among all other industries as the main contributor to severe and fatal accidents. Increasing safety is critical in the context of improving Productivity and efficiency in construction industry. However, improving occupational safety in the construction industry is essential, not only because enlightened clients demand excellent safety performance from contractors, but also due to continuous search for more economic benefit and increased productivity. Lean thinking is a new

way to manage construction. It aimed to redefine performance against three dimensions of perfection: (1) a uniquely custom product, (2) delivered instantly, with (3) nothing in stores. This is an ideal which maximizes value and minimizes waste. Minimizing waste in a production system is one of the cornerstones of lean construction. It indicated that the relationship between lean and safety is clear where incidents that disrupt the flow of work or lead to injury are waste. Improved safety performance, such as reduced injury and fatality rates, is an example of waste reduction. Accidents result in reduced efficiency of a process, resulting in non-value-adding events in a production system. Since lean principles aim at reducing waste, it would be prudent to assume that the reduction of occupational hazards is a naturally occurring outcome of the implementation of lean construction principles. The creation of a lean environment in a workplace requires employee motivation and good management. All the different levels of an organization need to put forth their best efforts on a day-to-day basis and work together toward achieving improved performance and reducing waste, thus productivity, quality and safety will be improved effectively.

The main purpose of LM is to satisfy customer needs on the highest possible level through the elimination of waste. Some sources of waste are overproduction, faulty products, sub-optimized processes, unnecessary waiting, movement or transportation, and excess inventory. In factories using lean manufacturing, large machines characteristic of batch-and-queue processes (typically referred to as “monuments”) are often no longer aligned with lean work cells and are not needed or desired. Instead, smaller more flexible machines are typically organized into work cells dedicated to the production of a family of products. Workers then operate the machines in the cell to minimize the cycle time for a family of products, minimize inventory, and maximize value. VSM is an activity improvement technique to visualize an entire production process, representing information and material flow, to improve the production process by identifying waste and its sources.

PROBLEM STATEMENT

The major problem in implementing 5S in construction industry is illiterate, unskilled labors & also the attitude of labours towards work. Cleanliness is also major problem at construction site. Also due to lack of communication between supervisors & labours the implementing of 5s methodology is becomes difficult. At construction site waste generation is more, due to negligence of managers, supervisors towards works, also transfer the responsibility to the subordinates.

All the work are depends upon labours. So, it affects the implementation of 5s. Small construction site are not interested in implementing 5s & other managements tools due to less work involved & also requirement of manpower for implementation is more which increase cost of total project.

OBJECTIVE

- The objective of this paper is to investigate the implementation of lean tools and its impact on reducing accidents in construction projects. The following tools were evaluated: last planner, increased visualization and 5s process. The paper presents the possibility and barriers of implementing lean construction tools.
- To observed proper practices & continuously improve them.
- To study the concept of lean construction & how is it being implied in the local construction industry.

5 IMPLEMENTATION PROCEDURE:

The 5s Process Construction is a dynamic production; lay down area change dramatically as production is moving forward, hence, the material layout plan should be a continuous effort that includes all trades' involvement. Throughout the project, Sort, Straighten, and Standardize are the winners in this category mainly due to management eagerly making efforts. Conversely, the traditional working behavior became an obstacle for the enforcement of shine (clean up) and sustain. Workers are used to being messy and throwing garbage on the ground, and they think that they were hired to do physical construction work, but not to clean up.

Housekeeping is a behavior that cannot be automatically enforced because workers are not used to it. Therefore, enforcement can't work directly. The foreman should create awareness in the basic principle of housekeeping: leave your work area as you receive it. Additional reasons why cleanup is difficult or not possible could be discussed with people who show little or no concern about housekeeping. Enforcement of the 5s Process is the responsibility of all members of the project. It seems easy to do but it is the most difficult tool to implement successfully. We realized that behavior change, commitment, and discipline are the keys to the success of housekeeping.

Step by Step Process: -

1. SORT: (Distinguish between what is needed and not needed), Sort out necessary & unnecessary items. The items deemed unnecessary and not being used should be removed from the area (incl. General area, Steel yard, Main Plant area, Office Area, Stores)
2. SET IN ORDER: A place for everything and everything in its place so it should be easy to find
3. SHINE: Keep work area clean and ready to use. Inspect regularly to ensure sort and set in order are maintained. (Cleaning and looking for ways to keep the workplace clean/organized)
4. STANDARDIZE: Maintain the first three S's and have an awareness of improving neatness.
5. SUSTAIN: The 5S Discipline is embedded so that it becomes a way of life. 5S is no longer an event but routine.

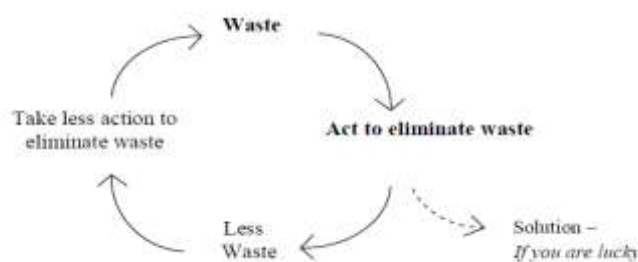


Fig. 1- Waste Elimination Cycle

ADVANTAGES

Following are the various advantages of using 5's tools in construction,

- Quality of work improved
- Minimum waste generation

- Better safety
- Productivity enhanced
- Provide immediate result
- Greater customer satisfaction

OBSERVATION TABLE

Following are the example of work sampling of plastering work (actual site observations)

Sr .No.	TIME Start End	DESCRIPTION OF WORK	QTY. OF WORK	REMARK
1	10.10- 10.40am	Preparation of material (Transportation & mixing)(1st wall)		There is no documents to access the given parameter but overall quantities needed are found to be sufficient
2	10.45- 11.25am	Actual plastering work start (1st wall)	3.20*1.25	Not Stored at proper location
3	11.30- 11.45am	Transportation & mixing (2nd wall)		
4	11.50am- 12.35pm	Actual plastering work start (2nd wall)	2.70*1.35	
5	12.40- 1.40pm	Lunch break		
6	1.40- 2.00pm	Rest		
7	2.00- 2.15pm	Transportation & mixing(3rd wall)		
8	2.20- 2.55pm	Plastering(3rd wall)	3.30*1.25	
9	3.00- 3.15pm	Transportation & mixing(4th wall)		
10	3.20- 4.05pm	Plastering(4th wall)	2.75*1.25	
11	4.15- 4.30pm	Preparation of material for next day		It is found at appropriate location
12	4.40pm	Day work complete		

Table -1: Observation sheet of red brick plastering work

Sr.No.	TRANSPORT (person)	WORKING (PERSON)	MIXING (PERSON)	WASTE OF TIME
1	1	2	1	(10.45-10.50) Worker of brick work waste 5min. for drinking water.
2	1	2	1	(11.50-12.00) Worker waste 10min. for smoking.
3	1	2	1	(12.10-12.15) Worker waste 5 min. for wash room.
4	1	2	1	(2.00-2.15) Take rest 15min.
5	1	2	1	(2.35-2.40) To collection the material 5 min.
6	1	2	1	4.10-4.18 Talking to each other 8min.

Table -2: Observation sheet of labour for red brick plastering waste of time

CONCLUSIONS

Lean tools helps to craft systematic processes with commitment tracking, Advance Constraint finding & resolution, Productivity Study, Time motion study to remove any kind of NVA waste, and creation of overall better work environment for everyone through 5S. As stated the objective is to study the productivity and compare the same with standard productivity.

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