

**TO ENHANCE THE FEASIBILITY OF LABOUR PRODUCTIVITY & WASTE
MINIMIZATION USING LEAN TECHNOLOGY**

¹Yash Ganesh Shetiye, ²Dr. A.W. Dhawale

¹PG Student, ²Professor

Department of Civil Engineer,

JSPM's Imperial College of Engineering & Research, Wagholi, Pune, Maharashtra, India

Abstract— In fast, development projects, it's anything but conceivable to deal with the task through the customary ways. It has been noticed commonly that the competence of the development exhausting and prompts modify and delivers numerous wastages, for example, over creation, stock, pointless transportation, laborers relocations, over handling, imperfection, holding up of materials, unused worker imagination, work mishap, and so on Hence viable thoughts and methods should be utilized in development that will help projects groups to manage wastages in development with the utilization of ideal assets and this can be accomplished by utilizing lean development standards and procedures So this paper expects to outline and examine the appropriateness of lean standards and its strategies utilized in development project which assists with lessening wastages in development and gets the nature of work item creating measure with raising the benefit level and furthermore which components influences to receive lean administration in development has talked about with the current development rehearses and past investigations In India, the application of lean administration in development industry is a significant assignment. Because of absence of consideration and uneducated towards the lean administration standard the proprietor, worker for hire, engineers and so forth are yet creating stage to carry out this guideline in their task. This task fundamentally centers around to distinguish the conceivable outcomes of execution of lean administration in development industry. It will be accomplished by setting up the poll and furthermore directing the meeting with the venture personals like top administration, designers, and site chiefs and so forth the surveys were assessed to embrace the procedures through measurable techniques. This paper presents the conceivable outcomes of viable use of lean administration rule in development industry, which can unquestionably build the nature of work and benefit rate by dispensing with the wastage of materials.

Keywords— lean, construction, control, and execution, Lean Management, Lean Manufacturing, Lean Leadership

INTRODUCTION

Lean development has been presented as another administration way to deal with work on the efficiency in development industry. Part of examination is going on towards the lean ideas and standards to get aftereffects of the fruitful adaption of lean thoughts from vehicle fabricating industry to the development business. The development organizations attempting to change their present types of undertaking the executives into the lean administration approach. In India, the development business is second biggest industry after horticulture .it is differentiated and associated with all circles of development like as following: Roads, Railways, Urban foundation, Ports, Airport.

Activities have been judged as impermanent based creation frameworks which should be planned, arranged, delivered a lot inside a predefined time. Quick track projects with since quite a while ago, convoluted inventory chains including numerous players and subject to various, broad cycle configuration changes have complex stream the board that has bombed hopelessly. Therefore, the business is described by delays and frequently has endured cost and time overwhelms. As a rule, an extremely significant degree of squanders/non-esteem added exercises is affirmed to exist in the development business. A few inquiries from various nations have affirmed that, squanders in development industry address a moderately huge level of creation cost. The presences of critical number of squanders in the development have drained generally execution and usefulness of the business, and certain genuine measures must be taken to redress the current circumstance. It has been battled by the Lean Construction Institute that about 57% of useful time waste can be found in the development business.

The regular venture the executives' approaches have insufficiencies in settling the issues in the business. In the United States, fastidious investigations have been done by CII (Construction Industry Institute), which gauge that somewhere in the range of 25% and half of the expense of development compares to squander because of the failure of the conventional administration framework. As indicated by (LCI) Lean Construction Institute, the development business is described by a proportion creation/squander higher than that of the assembling business. All things considered, lean assembling standards and methods give the establishments to minimization or all out end of the waste looked by the business. Lean development has changed the conventional perspective on work stream and work process unwavering quality and gives the worth added development.

NEED FOR LEAN IN CONSTRUCTION

The construction process is a set of activities, each of which is controlled and improved. Conventional managerial methods, like the sequential method of the project realization or the CPM network method, deteriorate flows by violating the principles of flow design and improvement. They concentrate on conversion activities. The resultant problems in construction to compound and self-perpetuate. In project control, fire-fighting current or looming crises consumes management resources and attention so totally that there is a little room for planning, let alone improvement activities. Therefore, it leads to non-optimal flows and an expansion of Non-Value Adding activities.

OBJECTIVES

The research seeks to confirm following objectives, which are:

- To find out the interrelation between effective construction waste management and its benefits towards the improvement of construction project performance.
- To find out the best solution for the efficient work by reducing the waste and to find out the critical situations on site and how to overcome those immediately to increase the productivity in construction based on cost effective.
- Analysis the economic feasibility factor using RII method for waste minimization such as reusing and recycling of construction waste materials by performing a benefit–cost analysis.

METHODOLOGY

In this investigation with reference to various papers, it is conclude that for any medium to large scale construction site applying construction waste technique will increase the productivity and reduces wastage of the construction in following manner.

- 1) To find out the various sources of waste generation in terms of material, and time required for recycling and reuse of construction waste and efforts generated in construction activities.
- 2) For further study in construction wastes take a case study that includes all construction activities. For that particular case study cost-time management will be done.
- 3) The material wastage generate on site will be measured and maximum amount of material will reuse and recycle to minimize waste. To find cost required to recycle and reuse using cost benefit analysis.
- 4) To find the factor of construction wastes prepare a questionnaires' related to wastages to know current scenario about construction waste management.
- 5) Collect all data regarding the particular survey and he respond of survey will analyze using SPSS software to find the frequency of question responses.
- 6) For finding factor of construction waste use Relative importance index in which rank shows which factor is more concern to wastages generate on site.
- 7) Apply the lean technology and the principles of lean technology to minimize the non- value added activity or wastage and increase the productivity of the construction industry.

- Rework (due to design errors detected during design)
- Non value-adding activities in information and work flows
 - Waste identification,
 - Source separation and collection;
 - Waste logistics;
 - Waste processing;
 - Quality management;
 - Policy and framework conditions

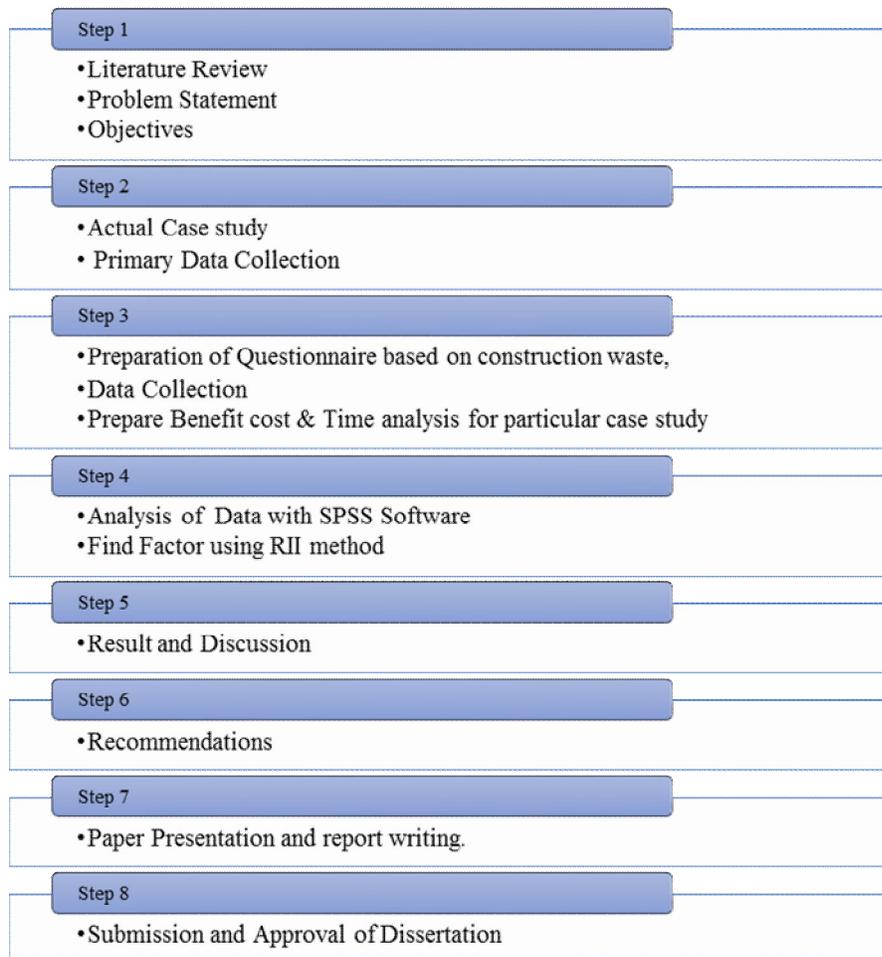


Figure: Proposed System Methodology Flow

To verify and re-evaluated the status of existing productivity and performances on construction activities and processes for construction industries

The cost of design is made up of costs of value-adding activities and waste. The waste in the design process is formed by.

Rework (due to design errors detected during design)

- Non-value-adding activities in information and workflows
- Proper relation flow is made for heavy equipment and for critical situation.
- Minimize physical and process waste.

Name of the project: Green Republic Samrat Buildcon
Location: Wagholi, Pune
Total project Cost: 50.30 Crores
Total Length: 39.75/34.825 m
Date of Commencement: October 2014
Completion period: 27 Months
Construction Type: RCC Frame Structure.
No. of Floor: G+11 Floor
Total Area of Building: 1, 15000 Sq. Ft.
Plinth Area: 8500 Sq. Ft.
RCC Contractor Name: Mr. Rohit Patel
Authority Engineer: Tejas Sanghvi
Local Authority: GP, Pune
Walls: 230 mm thick brick masonry walls only at periphery.
RCC Design Consultant: Vaastu Struct.



RESULTS & DISCUSSION

During the survey taken at the site it has been found by using SPSS Software and various lean tools & technique it helps to decrease the wastage of material, increase the quality of work, enhance the productivity at site. The various complexity in drawing can let increase in the wastage of the materials. The unsafe use of material increases the wastage of materials at site. There is various problems which can be minimized by using the lean techniques and tool, it has been discovered in result.

Following the result in the form of graph that are found during the Questionary survey carried out at site: -

Do you think using Lean management on site it will increase Quality of work at lower cost?



Figure1: Quality of work at lower cost.

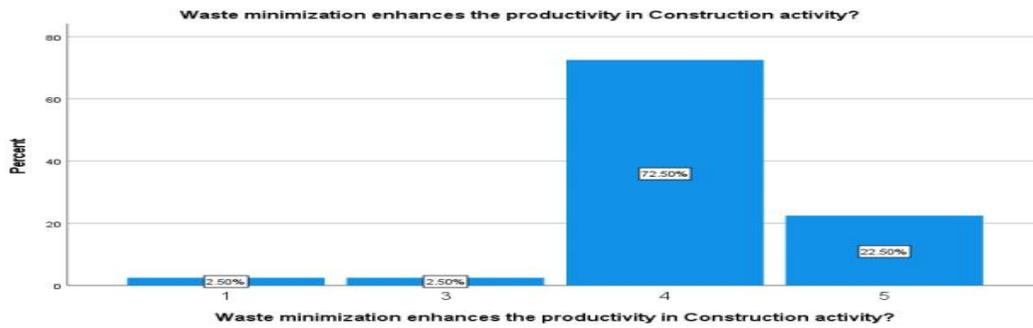


Figure2: Productivity enhancement in construction.

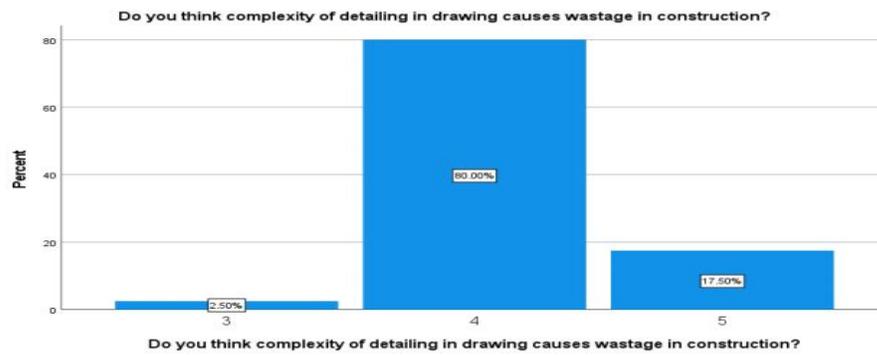


Figure3: Complexity of detailing in drawing causes wastage.

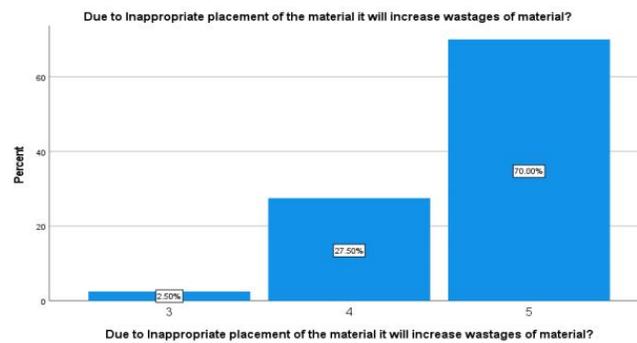


Figure4: Inappropriate placement of material.

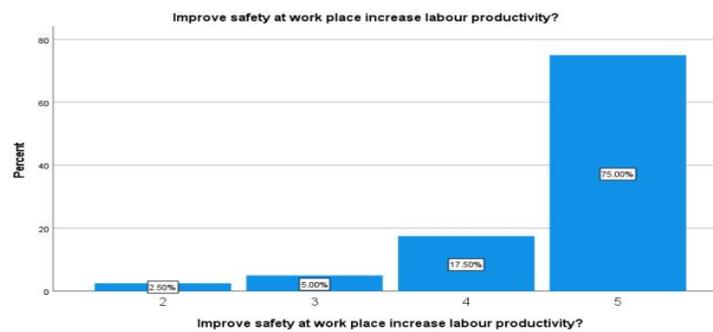


Figure5: Safety at work increase labor productivity.

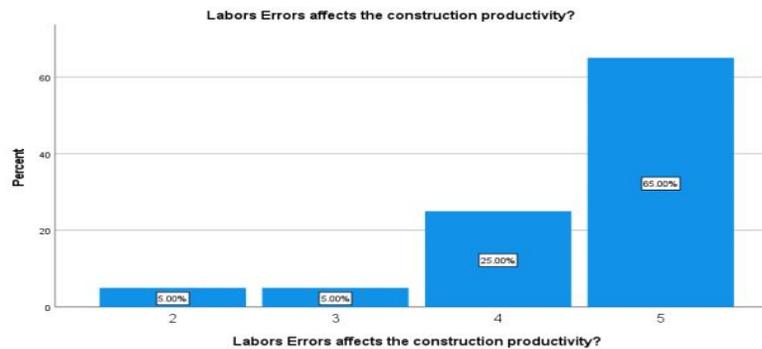


Figure6: labor error affects construction productivity.

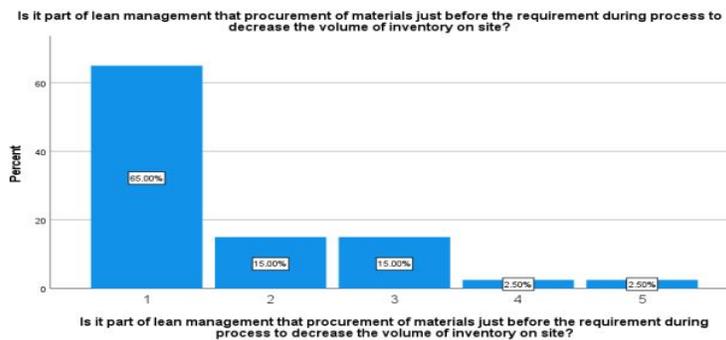


Figure7: Procurement of material before requirement.



Figure8: Training requirement at different levels.

CONCLUSION

Almost all lean tools & techniques are used in construction industry, but due to lack of supports from construction organizations and less research in lean construction they are not fully implemented as they are functioned. Many respondents using these techniques are not fully aware of their specified functions for that they are made. Although still Lean construction is in its beginning stages so large efforts are required to implement Lean techniques properly.

Important lean waste affecting on-site productivity includes unwanted movements, interruptions, extra processing and waiting time. Contributing activity and non-value-added activity also directly impact the rate of productivity. The major reason for this waste is the inconsistency in the allocation of jobs within the same

population, the unorganized working environment, and the poor outlook for workers. It is therefore necessary to reduce the variations in the process by optimizing the work sequence and the work crew to ensure a consistent and continuous workflow. The approach should also be targeted at reducing the work of the downstream worker. To ensure that on-site labor is still under production, the productivity of upstream and downstream workers should be comparable. Lean tools and procedures have been validated and have shown promising patterns in building efficiency growth. These lean tools are quick and efficient and can be implemented at least cost-effectively with a little extra effort and assistance from middle and upper-level management. It also enhances the trust of all stakeholders involved in the project, leading to a stable and reliable workflow.

FUTURE SCOPE

For future recommendations to assess the Lean benefits fully, organizations are suggested to arrange Lean workshops, seminars, and meetings to achieve the theoretical functions and benefits of lean techniques.

References

- [1] Effective Utilization of Lean Management in Construction Industry A. Chandrasekar, M. Logesh Kumar, June 2014,
- [2] General overview of Lean Management in Construction Industry Tejas Vidhate¹, Asst. prof Ashwini salunkhe², July 2018, Lean production in construction, Lauri Koskela,
- [3] Lean Construction Techniques in Indian Construction Industry: Some Analysis Vinaya D. More¹, Dr. Shrikant Charhate² and Madhulika Sinha.
- [4] Lean Management Principles by Prof. Rene T. Domingo.
- [5] Implementing Lean Construction: Understanding and Action, Glenn Ballard
- [6] Aakanksha Ingle, Prof Ashish P. Waghmare (November, 2015) "Advances in Construction: Lean Construction for Productivity enhancement and waste minimization International Journal of Engineering and Applied Sciences" (IJEAS) ISSN: 2394-3661, Volume-2, Issue-11, November 2015
- [7] A. Chandrasekar, M. Logesh Kumar (12, June 2014) "International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 12, June 2014 Effective Utilization of Lean Management in Construction Industry".
- [8] Greg Howelli and Glenn Ballard implementing lean construction: understanding and action.
- [9] Ms. Anjali Y. Bodkhe¹, Prof. Ashish P. ghamare², Prof. Shreedhar D. Patil (May 2017) "Investigation and Minimization of Construction Wastage Using Lean technology in Construction."
- [10] Vinaya D. More¹, Dr. Shrikant Charhate and Madhulika Sinha PG Student, (2016) "Department of Civil Engineering Lean Construction Techniques in Indian Construction Industry: "International Journal of Civil Engineering Research ISSN 2278-3652 Volume 7, Number 1 (2016), pp. 59-65 © Research India Publications".
- [11] Ashwin Amarshi Maru (2015), "Lean Construction in Civil Engineering And Project Management: Case Study Analysis Of Ut Arlington College Park", American Journal Of Civil Engineering 2015, Vol. 3, Issue 3, April 13, 2015, pp 70-74.
- [12] Michael J. Wodalski, Benjamin P. Thompson, Gary Whited, Awad S. Hanna (2011) "Applying Lean Technique in the delivery of Transportation Infrastructure Construction Projects".
- [13] Arleroth, Jens Kristensson, Henrik (2011) "Waste in Lean Construction- A Case Study".
- [14] CIRIA (2013) "Implementing Lean in Construction".
- [15] Fernandez-Solis, J.L., Porwal, V., Lavy, S., Shafaat, A., Rybkowski, Z.K., and Son, K. (2014). "Survey of motivations, benefits and implementation challenges of last planner system users." *Journal of Construction Engineering Management*, 139, 354-360
- [16] Morales Méndez JD, Rodriguez RS. "Total productive maintenance (TPM) as a tool for improving productivity: a case study of application in the bottleneck of an auto-parts machining line" *Int J Adv. Manuf Technol.* 2017;92(1-4):1013-1026. doi:10.1007/s00170-017-0052-4
- [17] Panwar A, Jain R, Rathore APS. *Journal of Manufacturing Technology Management Lean Implementation in Indian Process Industries – Some Empirical Evidence Lean Implementation in Indian Process Industries – Some Empirical Evidence.* Vol26.; 2015. <http://dx.doi.org/10.1108/JMTM-05-2013>
- [18] Venkataraman K, Ramnath BV, Kumar VM, Elanchezhian C. Application of Value Stream Mapping for Reduction of Cycle Time in a Machining Process. *Procedia Mater Sci.* 2014;6(Icmpc):1187-1196. Doi: 10.1016/j.mspro.2014.07.192

- [19] Singh R, Gohil AM, Shah DB, Desai S. Total productive maintenance (TPM) implementation in a machine shop: A case study. *Procedia Eng.* 2017;51(NUiCONE 2012):592- 599. Doi: 10.1016/j.proeng.2013.01.084.
- [20] Vinodh S, Gautham SG, Ramiya A. Implementing lean sigma framework in an Indian automotive valves manufacturing organization: A case study. *Prod Plan Control.* 2017;22(7):708-722. doi:10.1080/09537287.2010.546980