

## **PRODUCTIVITY ENHANCEMENT AND WASTE MINIMIZATION USING LEAN, SUSTAINABLE AND 5-S TECHNIQUES IN CONSTRUCTION INDUSTRY**

Snehal S. Mote

P. G. Student, Department of Civil Engineering,  
TKIET, Warananagar, Maharashtra, India

Prof Amit B. Patil

Assistant Professor, Department of Civil Engineering College,  
TKIET, Warananagar, Maharashtra, India

### **Abstract:**

Construction industry is one of the significant and largest industry on global level and also it is a most important part of economy. It has potential to make a positive impact on sustainable and lean construction development. Lean construction focuses on lowering costs by eliminating waste, innovating by involving people, and structuring the workplace to be more efficient. While implementing lean concepts necessitates reevaluating current construction procedures and methods, new tools are also required. Additionally, lean, which primarily focuses on minimizing the environmental impact of construction, may have an impact on sustainability in addition to improving project time and cost performance. The lean methodology aims to reduce waste in this process. Which is typically divided into seven categories: overproduction, waiting time, transportation, extra procedures, inventory movements, faults and the operators lack of participation in generating process improvement ideas. As a result, lean-based tools have been developed and effectively used in both straightforward and intricate building projects. Lean construction projects are typically less expensive, safer, quicker to complete, easier to manage, and of higher quality

**Keywords:** 5-S Methodology, Sustainable construction, Waste minimization, Productivity

### **INTRODUCTION**

Lean Construction focuses on minimizing waste and maximizing value through efficient processes. Sustainable Construction emphasizes environmental stewardship and resource efficiency. Together, they create a framework for improving project outcomes while being mindful of environmental impacts. By integrating lean principles with sustainable practices, the construction industry can achieve significant improvements in efficiency, cost-effectiveness, and environmental responsibility. This holistic approach not only benefits projects but also contributes to a more sustainable future. By using 5-S we can reduce waste and optimize productivity. 5-S is a five-step methodology for creating a more organized and productive workplace. The 5-S phrases in this system are from Japanese and are usually translated as Sort, Set in order, Shine, Standardize and Sustain. 5-S methodology can manage space, human effort, time, quality and capital to make the end product with less faults and make the site well ordered, disciplined and clean place to work. Its outcome is the successful association of the work environment, lessening of work, change of the quality and security of work and also increase productivity and reduce waste.

**1.1. DEFINATION:**

The 5S methodology is a five step process for organizing a workplace to improve efficiency and reduce waste.

**Sort:** Identify and sort the items in their proper place.

**Set in order:** Put items in their proper place.

**Shine:** Clean and inspect tools and equipment and put them away in their designated places.

**Standardize:** Establish standards for how work should be done.

**Sustain:** Maintain the new organizational system.

**1.2. PURPOSE:**

**1.Increase Efficiency:** Streamlining processes reduces time wasted on searching for tools or materials.

**2.Enhance Safety:** A clean and organized workplace minimizes hazards and promotes safety.

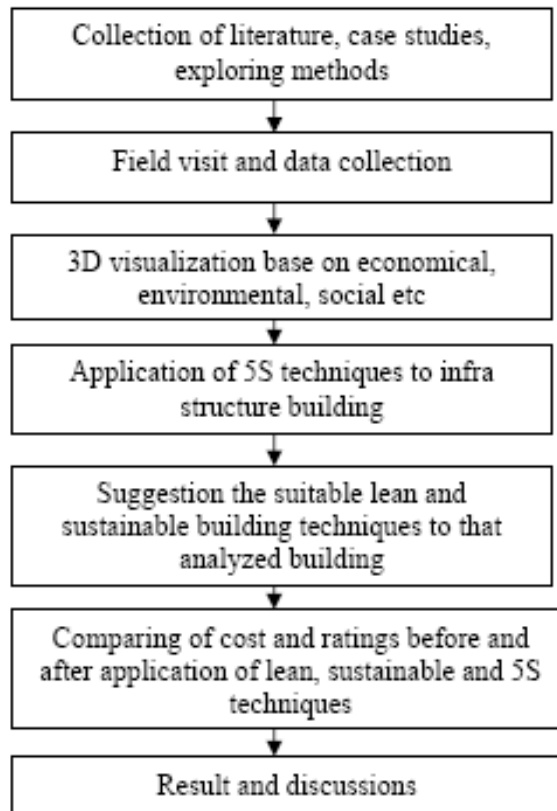
**3. Improve Quality:** A well-maintained environment contributes to better quality outputs by reducing errors.

**4.Boost Morale:** A tidy workspace can lead to higher employee satisfaction and motivation.

**5.Facilitate Continuous Improvement:** Establishing a culture of discipline and standardization encourages ongoing enhancements in processes.

Overall, the 5S methodology aims to create a more productive, safe, and pleasant working environment.

**1.2. METHODOLOGY FLOW CHART:**



### 1.3. NEED OF STUDY:

The need for the 5S methodology arises from several critical challenges faced in various workplaces. Here are some key reasons why organizations implement 5S:

1. **Efficiency Improvement:** Disorganized workspaces lead to wasted time searching for tools and materials. 5S helps streamline processes and reduces lead times.
2. **Cost Reduction:** By minimizing waste and inefficiencies, organizations can lower operational costs, leading to better financial performance.
3. **Enhanced Safety:** A clean and organized workplace reduces hazards, decreases the risk of accidents, and promotes a culture of safety.
4. **Quality Control:** Clutter and disorganization can contribute to errors. 5S fosters a structured environment, which helps maintain high-quality standards.
5. **Employee Morale:** A tidy and efficient workspace boosts employee satisfaction and productivity, as workers feel more comfortable and empowered in their environment.
6. **Sustainability:** Implementing 5S can lead to better resource management, helping organizations to minimize waste and adopt more sustainable practices.
7. **Continuous Improvement Culture:** 5S encourages a mindset of ongoing improvement, fostering an environment where employees are engaged in enhancing processes and practices.
8. **Standardization:** Establishing a Result and discussions helps ensure that best practices are followed consistently across the organization.

In summary, the 5S methodology addresses fundamental issues related to organization, efficiency, safety, and quality, making it a valuable tool for any organization aiming for operational excellence.

### 1.6. OBJECTIVES:

The research seeks to confirm following objectives, which are:

1. To study the present status and make literature review of relation between lean construction and sustainable construction in Kolhapur Maharashtra India region.
2. To identify lean and sustainable construction concept and its applicability in Indian construction industry by using 5-S methodology.
3. To reduce consumption of non-renewable resources, minimize waste and create healthy productive environment.
4. To recommend best suggestive measures and benefits of using lean, sustainable construction and 5-S methodologies. Perform 5-S methodologies for improving productivity for selected study area.

### 1.7. SCOPE OF STUDY:

**Efficiency Gains:** Reducing time spent on non-value-adding activities.

**Enhanced Quality:** Decreasing errors and improving output quality.

**Safety Improvements:** Creating a safer working environment.

**Employee Engagement:** Involving staff in the process promotes ownership and accountability.

In summary, the scope of the 5S methodology is broad and applicable to virtually any environment where organization, efficiency, and quality are priorities. Its principles can be tailored to meet the specific needs of different industries and work settings.

**References:**

1. Aakanksha Ingale, Ashish P Waghmare (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
2. Aman Hiwale, Amol Wagh, Vinay Waghmare, Devendra Khairnar, Sanjit Champanerkar, Pravin Mane (June 2018) "Effectiveness of 5s Implementation in Lean Construction (Commercial Building Construction Project)" ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 6 Issue VI,
3. David Carvajal-Arango, Sara Bahamon-Jaramillo, Paula Aristizabal-Monsalve, Alejandro Vasquez-Hernandez Luis Fernando Botero Botero. (20 May 2019) "Relationships between lean and sustainable construction: Positive impacts of lean practices over sustainability during construction phase" ELSEVIER PP-1322-1337
4. Dixit, S, Mandal, SN, Sawhney, A and Singh, S (2017) "Area of linkage between lean construction and sustainability in Indian construction industry". International Journal of Civil Engineering and Technology, 8 (8). ISSN 0976-6308
5. Harish Kumar Banga, Rajesh Kumar, Puneet Kumar, Ayush Purohit, Hareesh Kumar, Kamalpreet Singh (7 May 2020) "Productivity improvement in manufacturing industry by lean tool" ELSEVIER 2214-7853
6. Jugraj Singh, Randhawa, Inderpreet Singh Ahuja, (2017), "5s - a quality improvement tool for sustainable performance: literature review and directions", International Journal of Quality & Reliability Management, Vol. 34 Iss
7. Mohd Arif Marhani, Aini Jaapar, Nor Azmi Ahmad Baria, Mardhiah Zawawi (2013) "Sustainability through Lean Construction Approach: A literature review" ELSEVIER PP 90-99
8. Oluwatosin Babalola, Eziyi O. Ibem, Isidore C. Ezema (2019) "Implementation of lean practices in the construction industry: A systematic review" ELSEVIER PP 34-43
9. R. Ajay and M. B. Sridhar (2016) "Incorporation of 5s methodology in construction practices." Int. J. Chem. Sci.: 14(S1), 2016, 127-134 ISSN 0972-768X
10. Reza Kiani Mavi, Denise Gengatharen, Neda Kiani Mavi, Richard Hughes, Alistair Campbell and Ross Yates (11 Feb 2021) "Sustainability in Construction Projects: A Systematic Literature Review" Sustainability 2021, 13, 1932 MDPI
11. Saad Sarhan, Amira Elnokaly, Christine Pasquire and Stephen Pretlove (2021) "Lean construction and sustainability through IGLC community: A critical systematic review of 25 years of experience" 26th Annual Conference of the International Group for Lean Construction (IGLC), González, V.A. (ed.), Chennai, India,
12. Sam Solaimani, Mohamad Sedighi (8 Nov 2019) "Toward a holistic view on lean sustainable construction: A literature review" ELSEVIER PP- 11921.