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## IMPROVING MATERIAL PRODUCTIVITY THROUGH IMPLEMENTATION OF 5'S METHODOLOGY ON CONSTRUCTION PROJECT

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**Abstract:** The Productivity is the key factor for any growth of the construction firm because it play dual role such as performance of the industry and economic growth of the industry .The productivity rate of the construction firm can be raised by proper planning, scheduling and controlling the resources. This correct management system will reduces the time, price and conjointly will increase the standard of the product. In any construction firm the resources are namely man, machine& material& finance are utilized to get a better quality of product. Out of this material productivity is play importance role for the performance . This study determines varied issue moving on material productivity on construction site. Study the lean construction concept and their tools. Choose the better tool for implementation on actual site. Then implement the tool of lean construction on actual site and observe the changes. Compare this site with other regular site and analyze the practical conclusions.

**Index Terms – Productivity, 5'S, Lean construction, Cost comparison, Work breakdown structure.**

### I.INTRODUCTION :

Productivity is mostly outlined because the magnitude relation of output to input. For achieving the better productivity the main task to study the material waste which affects the material cost as well as total cost .In every project there is cost, time and quality are main concern .Efficient material management is essential in managing a productive and cost effective site. At many construction site it is observed that, there is improper handling of material, improper storage of material and therefore there is a unskilled working environment which results in wastage of material and time. So we will identify the reasons of wastage by observation study on actual construction site. Then we will apply 5s methodology at that construction sites and by removing wastage we will improving the material productivity.

### II.METHODOLOGY :

Lean construction is gradually gaining global acceptance due to its positive and cost effective results. Lean construction practice is centered around the application of Lean principles in construction activities. Lean construction tends to minimize the different forms of waste through the application of Lean principles to the production process.

Following are some tools which are used in lean construction

1. Last Planner System
2. KAIZEN
3. KANBAN
4. 5'S Methodology

All above tools has their own specification and different in their own manner with each other. Last planner system is focused on worker's productivity and accountability through scheduling and planning. In this system contractor and subcontractor are mainly responsible for the every work on site. The Kizen is related with improvement of practices on site with only available facilities. Kizen is useful on the sites where work is divided in shifts because we do the comparison between practices of shifts with same facilities. The kanban tool is focused on work order at construction site. Any activity first start with their planning and does not possible without kanban tool. But 5'S tool is directly related with the material production. In this we increase the material efficiency with reducing wastage on construction site. In this tool process is related with the workers therefore they

also responsible for construction cost. In this process we increase the some facilities like storage for materials, cleaning facility etc. Planning is done in good manner in 5'S tool. As per observation construction site is mainly needed improvement in material productivity with wastage reduction and all peoples on site are responsible for every activity. Also in this we have scope for implementing new facilities. So as per overall observation and tools comparison 5'S tool is better option for our case study so use the 5'S technique.

**(A) Work breakdown structure (WBS) :**

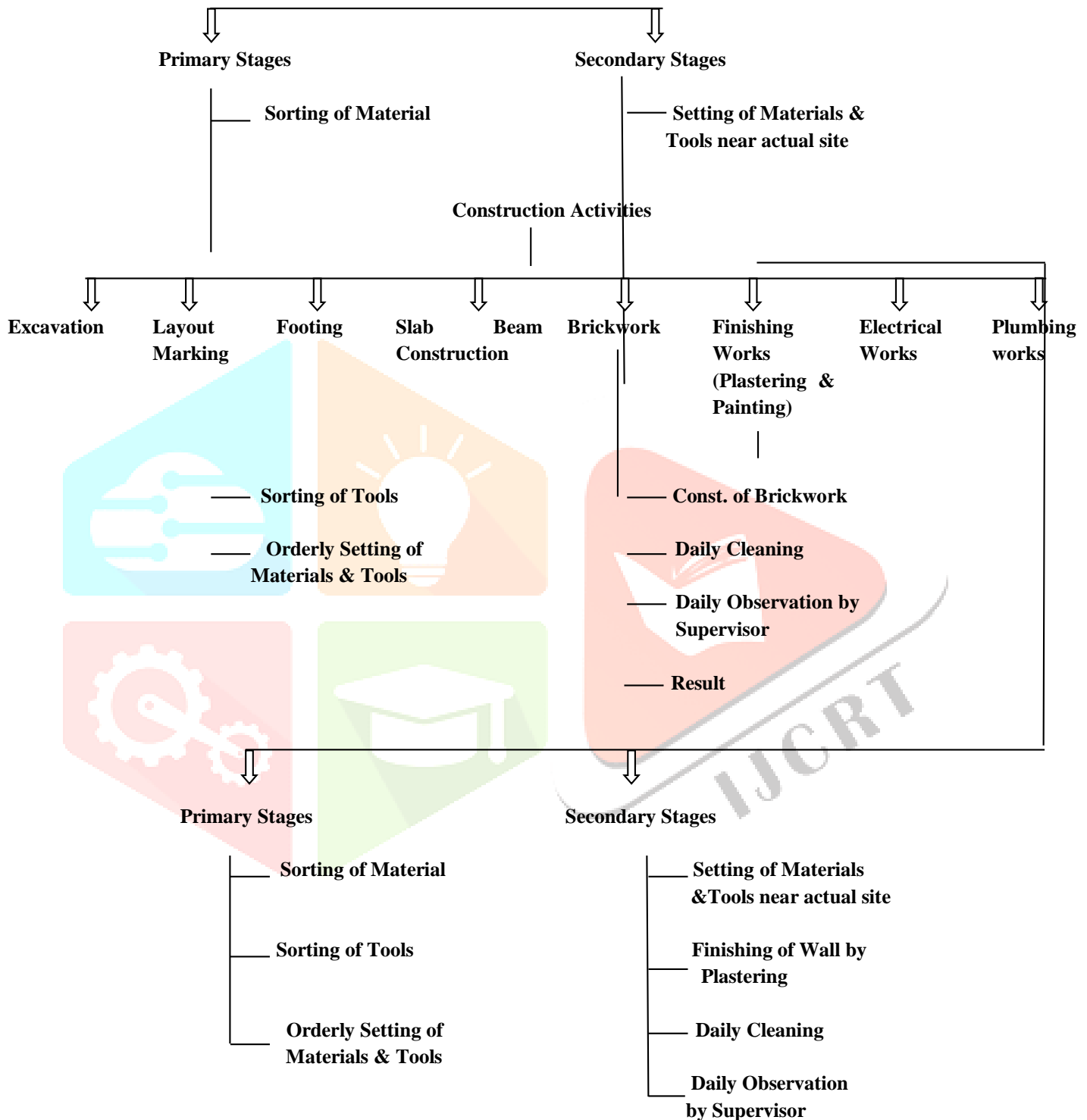


figure no.1 work breakdown structure

### III.MEASUREMENT OF PRODUCTIVITY :

**(A) Case study details :**

The construction sites was located in Yashwantnagar , Vita Dist- Sangli. In this area total 22 residential building sites which are in working condition but we select the twin bungalow site which is helpful for the comparative analysis.

The details of buildings are as under

❖ **Building A (With 5'S Methodology) :**

- Type :- Residential Building (G+1)
- Address :- Yashwantnagar vita..
- Built-up Area :- 2925 sq.ft
- Brickwork :- 73.86 m<sup>3</sup>
- Plasterwork :- 823.35m<sup>3</sup>

❖ **Building B (Without 5'S Methodology) :**

- Type :- Residential Building (G+1)
- Address :- Yashwantnagar vita..
- Built-up Area :- 2925 sq.ft
- Brickwork :- 73.86 m<sup>3</sup>
- Plasterwork :- 823.35m<sup>3</sup>

❖ **Rates of Material :**

- 1 Ambuja Cement= 250 Rs/-
- 1 Brick = 5 Rs/-
- 1 Brass = 10000 Rs/-

**(B) Measurement of case study :****(a) Brickwork Quantity :**

table no. 1 brickwork quantity

Material	Estimated	Conventional	Utilized	
			Building A	Building B
Cement (bag)	136	144	138	142
Brick (no)	38331	40275	39085	39620
Sand (Brass)	6.4	7.2	6.8	7

**(b) Percentage wastage in Brickwork :**

table no. 2 percentage wastage in brickwork

Material	Building A	Building B
Cement	1.4	4.2
Brick	1.9	3.25
Sand	5.8	8.6

**(c) Cost Comparison for brickwork :**

table no. 3 cost comparison for brickwork

Material	Estimated	Conventional	Building A	Building B
Cement	34,000	36,000	34500	35500
Brick	1,91,655	2,01,375	1,95,425	1,98,100
Sand	64,000	72,000	68,000	70,000
Total	2,89,655	3,09,375	2,97,925	3,03,600

**(d) Plasterwork Quantity :**

table no. 4 plastering quantity

Material	Estimated	Conventional	Utilized	
			Building A	Building B
Cement (Bags)	58	67	61	65
Sand ( Brass )	4.27	4.74	4.49	4.62

**(e) Percentage Wastage in Plastering :**

table no. 5 percentage wastage in plastering

Material	Building A	Building B
Cement	4.91	10.7
Sand	4.89	7.57

**(f) Cost Comparison for plastering :**

table no. 6 cost comparison for plastering

Material	Estimated	Conventional	Building A	Building B
Cement	14,500	16,750	15,250	16250
Sand	42,700	47,400	44,900	46,200
Total	57,200	64,150	60,150	62,450

**IV.PRODUCTIVITY ANALYSIS :****(a) Brickwork activity :**

Following table shows cost comparison between Estimated quantity, Building A, Building B.

table no. 7 Cost Comparison for brickwork activity

Material	Estimated	Building A	Building B
Cement	34,000	34500	35500
Brick	1,91,655	1,95,425	1,98,100
Sand	64,000	68,000	70,000
Total	2,89,655	2,97,925	3,03,600

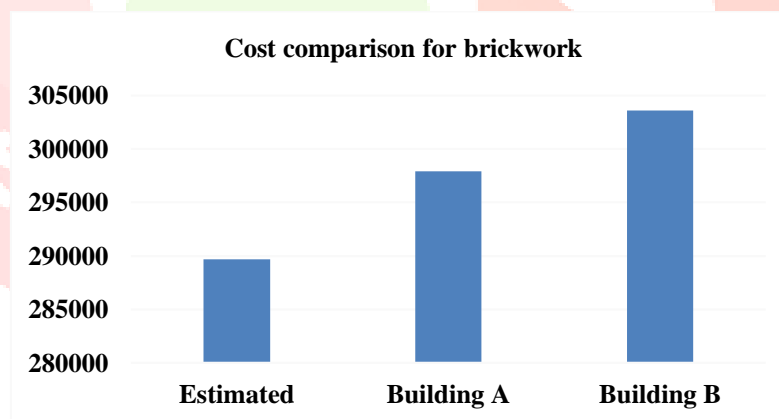


Figure no. 2 Graphical representation of cost comparisons for brickwork activity

**(b) Plastering activity :**

Following table shows cost comparison between Estimated quantity, Building A, Building B.

table no. 8 Cost Comparison for plastering activity

Material	Estimated	Building A	Building B
Cement	14,500	15,250	16250
Sand	42,700	44,900	46,200
Total	57,200	60,150	62,450

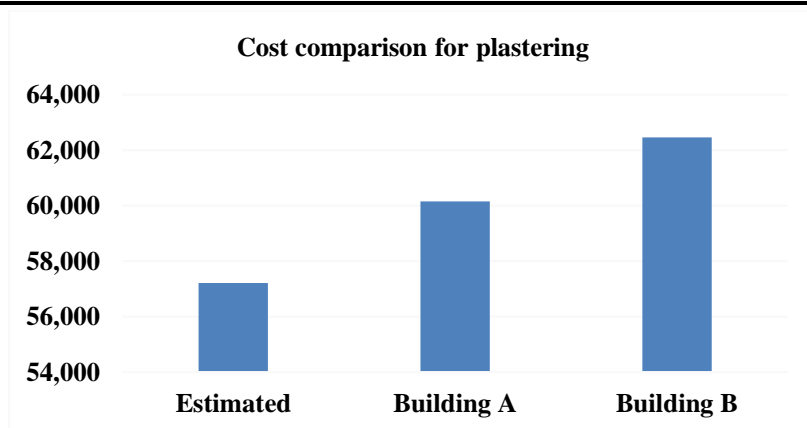


Figure no.3 Graphical representation of cost Comparison for plasterwork

## V. OVERALL COST COMPARISON:

After application of 5'S methodology on construction activity brickwork and plasterwork there is reduction in wastage in material which is directly affects the cost of construction. Following calculation shows the cost of saving after application of 5'S methodology.

For G+1 Building

$$=(3,03,600+62,450)-(2,97,925+60,150)$$

$$=3,66,050-3,58,075$$

$$=7,975 \text{ Rs/-}$$

## VI. CONCLUSIONS :

For successful implementation of 5'S methodology need to increase awareness about lean construction and its importance. From the feedback of 5'S methodology it seems that there is need of training of workers as well as some modification in 5'S methodology. Practice of 5'S methodology will give better result. After applying 5'S methodology on actual construction site the wastage reduces for brickwork is, of cement: 2.8% , Brick : 1.35% and of Sand : 2.8% and for plastering is, of cement: 5.79 and of sand: 2.68 .Total cost for brickwork and plaster is reduce by Rs. 7,975 for 5'S implemented building.

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