The Main Barriers towards the Implementation of Lean Planning

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***Abstract*- Lean construction is as an effective management tool to enhance the productivity in construction field. It was recognized that the lean production principles could be applied not only to manufacturing process, but also to other business process. The objective of the Lean principles has to address the existing problems in the construction sector and eliminate it. The intention of the Lean construction approach is to reducing the costs by the elimination of the unwanted waste. Lean construction can be characterized as techniques, which consist of variety of tools and approaches which is aimed at maximizing value and minimizing waste. Large researches have been done in recent past and is an ongoing process to adopt lean principles from manufacturing industry to the construction industry. There are many challenges in implementing the lean concept in construction industry in India, Mainly due to lack of attention and illiteracy towards the lean management principle, stake holders techniques associated to this like builder, contractor, and engineering and project management firms etc. are still in process of adopting this principle for construction project. In this paper effort are made to found out main barriers towards the implementation of lean techniques.**

***Index terms*- lean construction, lean technique, statistical package of social science, waste.**

I.INTRODUCTION

Construction is well known for its many uncertainties, so that uncertainty seems to be the only certainty in this field! In such a context, one major process which promises to reduce the uncertainty and make the construction process more efficient and cost-effective has made its advent in India in the recent past. That is the "Lean Construction".

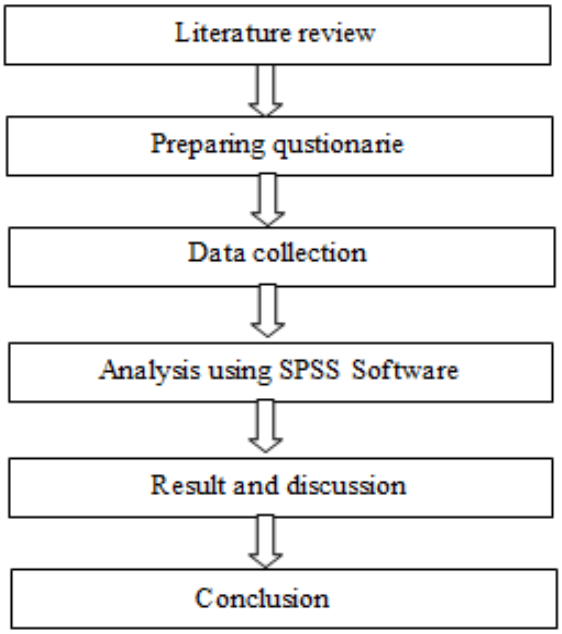
The basic concept for Lean Construction originated from the Lean Manufacturing principles implemented by Toyota Motors successfully in their renowned Toyota Production System (TPS). Even though construction is unlike manufacturing, many of the principles of Lean Manufacturing can be applied to construction. It is essentially based on a continuous improvement strategy, covering avoidance of all types of waste, optimising and improving processes, smoothening workflow, synergising and integrating efforts of all stakeholders to improve certainty at various stages and to get the best overall results for the project. The Lean process identifies waste in all forms and strives to eliminate it and hence add considerable value. Although the Lean method is used to identify waste, it does not eliminate or reduce variability in processes. The main Benefits of lean concepts are improved quality, eliminate waste, reduce time, reduce total cost, improve employee morale, ensures a safer. Lean is a systematic method for the elimination of waste.

II. OBJECTIVE

1. To identify waste in local construction industry and relate them under Lean Construction and also rank them.
2. To find the factors affecting the implementation of lean planning.

III. METHODOLOGY

In this paper, the data were gathered through questionnaire survey from 30 construction companies. The questionnaire survey was conducted on the basis of 5-point likert scale. The results obtained from the data are evaluated in order to find the main barriers towards lean implementation. The data were analysed using SPSS Software and ranked on the basis of Relative Important Index. The following flow chart represents the methodology of this paper.



IV. BARRIERS IN LEAN IMPLEMENTATION

This section is designed to assess the barriers for lean implementation on the basis of literature review questionnaire had been prepared and data collection was done. The collected data were analyzed on the software statistical package for the social science. From this analysis the five most critical factors are identified, these barriers are found out based on the Relative Importance Index.

The RII was calculated by using the formula as below

$$RII = \frac{\Sigma w}{AN}$$

Where,

w – Weighting given to each factor by respondents

A - Highest weight ('5' in this case)

N - Total number of respondents

TABLE – I FACTORS AFFECTING THE IMPLEMENTATION OF LEAN

SL. NO	FACTORS	MEAN	STD DEVIATION	RANK
1	Work standards	2.23	1.073	22
2	Repair work	2.47	1.106	9
3	External delay	2.50	1.055	6
4	Lean design	2.47	1.167	10
5	Work scheduling	2.33	1.155	21
6	Team work	2.40	1.070	13
7	Work defects	2.53	1.167	4
8	Weather condition	2.40	1.102	14
9	Bad storage	2.40	1.133	15
10	Lack of skilled labours	2.60	1.221	3
11	Poor material managing	2.53	1.196	5
12	Lack of manpower resources	2.43	1.223	1
13	Bad supervision	2.33	1.241	2
14	Equipment breakdown	2.63	1.159	16
15	Lack of knowledge	2.37	1.217	18
16	Work structuring	2.63	1.159	20
17	Reduction of waste	2.33	1.124	7
18	Time management	2.50	1.167	17
19	Customer satisfaction	2.37	1.033	19
20	Cost reductiom	2.33	1.184	8
21	Availability of labour	2.50	1.075	11
22	Old equipment	2.47	1.106	12

Based on the Relative Importance Index method analysis, the ranking is provided to data. From this analysis, the top 5 ranked factors are identified.

TABLE – II TOP 5 FACTORS AFFECTING THE IMPLEMENTATION OF LEAN

FACTORS	RII (%)	RANK
Euipment breakdown	67.50	1
Work structuring	65.83	2
Lack of skilled labors	65.50	3
Work defects	65.00	4
Poor material management	64.16	5

V. RESULT AND DISCUSSION

Analysis was done on the basis of mean value of the questionnaire, the recommended actions for the identified factors were considered.

1. EQUIPMENT BREAKDOWN

The equipment breakdown can be defined as the failure of machine during the function of a construction process

It is caused mainly due to:

- Improper maintenance
- Not reading operations manual
- Poor electrical connections
- Over running machines capability
- Not replacing worn parts when needed tighter misalignment.

2. WORK STRUCTURING

Work structuring is the breakdown of both product and process into chunks, sequences and assignments to make work flow smoother and with less variability.

It is mainly occurred due to:

- Interdependence of product and process design decisions.
- The feasibility of completing the work within the available time should be demonstrated.

3. LACK OF SKILLED LABORS

The Shortage and lack of experience of skilled worker may result in lack of trade's skills which lead to waste. lack of experience of skilled labor was the main cause of building waste on sites. Elements impacting on the quality of working life includes:

- The physical conditions of the workplace
- The degree of flexibility of employee work hours
- The lack of interest to work
- The intensity of work
- Freedom from harassment and discrimination
- Opportunities for overtime work at the choice of the employee
- Whether there is a culture of long hours of work
- Whether work is expected in unsociable hours.

4. WORK DEFECTS

Defects are caused by incorrect method due to non-standard operations, differences in the way that processes are undertaken by different operators. They fail to maintain equipment, machines and fixtures and these may allow defects to occur. Which is caused mainly due to:

- As a result of design deficiencies
- Material deficiencies
- Specification problems and workman deficiencies.

5. POOR MATERIAL MANAGEMENT

Material management is the process which ensures that the right materials are available at the right place at the right time in the right quantity and quality and at the right cost. It is the result of poor quality of materials

- Due to lack of experience of workers
- Long project duration
- Wrong handling of materials
- Lack of storage of materials.

VI. CONCLUSION

The fundamental idea of lean planning is that it performance is improved, quality, capacity, cycle time, inventory levels, and other key factors as reduction waste, energy sources and environment will also improve. Thus, when these factors are improved, both the provider and the customer experience greater satisfaction in performing business transactions.

From the ranking, it is obvious that the activities at the site is influenced at a higher order by the planning and scheduling activities in order to achieve smooth workflow throughout the project. Each individual should be aware of schedule depending on day, weekly and monthly works. The identification of the incidence of non – value added activities during the process enables the construction managers to easily identify the best solutions and ways to apply new techniques for reducing waste, leading to process improvement. And it is hoped that, Implementation of Lean construction will leads to process improvement and enhance the reduction of waste.

REFERENCES

[1] Ahmed Mousa. (2013), 'Lean, six sigma and lean six sigma Overview', International Journal of Scientific & Engineering Research, Volume 4, Issue 5, pp 1137-1153

[2] Mehmet Tolga Taner.(2013), 'Critical Success Factors for Six Sigma Implementation in Large-scale Turkish Construction Companies', International Review of Management and Marketing Vol. 3, No. 4, pp.212-225

[3] Mohamed K. Hassan. (2013), ' Applying Lean Six Sigma for Waste Reduction in a Manufacturing Environment', American Journal of Industrial Engineering, Vol. 1, No. 2, 28-35

[4] M.P.J. Pepper.(2010), 'The evolution of lean Six Sigma', International Journal of Quality & Reliability Management Vol. 27 No. 2, pp. 138-155.

[5] Sanjay Kumar. (2012), 'Lean Six Sigma Implementation: An Analytic Hierarchy Process Approach', International Journal of Technology Management 57, no. 1 : 18-32.

[6] S. Sriram.(2016), 'Implementation of Six Sigma Concepts in Construction Project for Ensuring Quality Improvements', International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 4, pp 4913-4921.
[7] Sunil V. Desale. (2013), 'Lean Six Sigma Principal in Construction' International Journal of Emerging Technology and Advanced Engineering Volume 3, Issue 5, pp 531-535.
[8] Sunil V. Desale. (2013), ' Lean six sigma principal in construction: A literature review related to abstract', Journal Of Information, Knowledge And Research In Civil Engineering, Volume 2, Issue 2 pp 133-139.
[9] Thomas Gachie. (9/4/2015), 'The Implementation Of Lean Six Sigma Concept at National Bank Of Kenya-Operation Division', 19-ICIT: 7-hosted by KIM, Nairobi ST-3: 5-S, 6-Sigma, Innovation & Ethics.
[10] Xiaoning Zhu Dongling, 'Lean Six Sigma A Literature Review', Interdisciplinary Journal Of Contemporary Research In Business, VOL 3, NO 10 pp 599-605.
[11] Radhika R, (2017)' An Overview of the Concept of Lean Construction and the Barriers in Its Implementation', International Journal of Engineering Technologies and Management Research, Vol 4, issue 3.