

## A Review on Concept, Applicability and Implementation of Just-In-Time Technique in Construction Industry

Ms. Priya Patil<sup>1</sup>, Prof. Dr. A. W. Dhawale<sup>2</sup>

<sup>1</sup>PG Student, JSPM's Imperial College of Engineering and Research, Wagholi, Pune.

<sup>2</sup>Associate Professor and HOD Civil Engineering Department, JSPM's Imperial College of Engineering and Research, Wagholi, Pune.

Corresponding Author: Ms. Priya Patil

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**ABSTRACT:** Each venture has a planned service date, which ought to be met fulfilling a budgeted finance. In this situation, the most useful technique is “just-in-time” construction that provides a significant improvement of project cost and time management. The fundamental principle of this technique is to achieve project time limitations without any unnecessary schedule improvement. During the course of construction, it is necessary to provide constant project control to monitor progress and add resources only when it is required to meet a project service date. Hence, this research paper mainly focuses on applicability, significance and barriers to adopt JIT technique in construction projects based on rigorous literature survey.

**KEYWORDS** -Inventory management, Just in Time Technique, Total Quality Management.

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### I. INTRODUCTION

Increasing Global competition has forced the Construction Industries to look for some new techniques to face the challenges in Construction Industry. During last two or three decades, all over the world construction environment has experienced more changes, particularly, the construction environment has become prominent factor in creating the value added contents for the products and service. [4] The conventional approach to material delivery used in construction projects for many years. The approach created lot of problem to construction industry. Fast development in communication, better quality material and fast material transportation systems has become global in nature.

Today construction industry needs to minimize cost in addition to improve quality and on-time delivery. According to lean manufacturing, “inventory” is important factor of any construction firm that increases cost, reduces profitability and requires more working capital without adding any value to the customer and organization. Unfortunately, in our traditional accounting system, inventory plays role as an “asset” whereas it is a most expensive “liability”. This fact was discovered by Toyota Motor Corporation and they developed a unique “Just-In-Time” technique to reduce inventory to the minimum possible degree. [5] Just-in-time (JIT) is a stock control strategy used to increase efficiency and decrease waste thereby lowering inventory prices.

### II. LITERATURE STUDY

#### 2.1 “JIT System: Concepts, Benefits and Motivation in Indian Industries” by Dr. Sultan Singh, Dr. Dixit Garg.

In this research paper, the general concept of JIT is given which includes the origin of this technique, what are the objectives of JIT method, various advantages of JIT and how the implementation process of just-in-time technique can be done. Authors also discussed the spread of JIT movement i.e. the flow of the applicability of JIT technique through various industries and hence in that section author concluded that it is not a technique or a set of techniques, but it is philosophy or an overall approach in which both old as well as latest inventory control techniques are focused.

#### 2.2. “Just in Time in Construction: Description and Implementation Insights” by Flora Bamana, Nadia Lehoux, and Caroline Cloutier.

This paper shows how the JIT technique can help with respect to costs, waste, project deadlines and various quality problems arrives in construction practices. In this research paper, authors have basically used the systematic literature review (SLR) [2] to find out how JIT technique can be implemented. Authors also have explained the implementation process of JIT in construction in four different scenarios depending on three parameters which are site management, supply chain co-ordination, and information about material procurement process sharing. Finally, it is concluded that on the basis of systematic literature review, Just-in-time technique can be applied in construction.

**2.3 “A study on different inventory management techniques in construction” by Kanani M A, Sharma N D, Kashiyani B K.:**

Authors said that the term inventory refers to the goods or materials utilized by a company for the reason of producing and sale. It is usually the objects, which can be used as supportive materials to facilitate production. Nearly 60% of cash is allotted for the inventory in a venture. Inventory adds up one of the vital items of current assets, which lets in smooth operation of manufacturing and sale process of a firm. Inventory management is that aspect of current assets management, which is involved with preserving most desirable funding in stock and making use of effective control system so that it will limit the full inventory price. Funding in stock absorbs a large portion of the running capital of a company and frequently it represents a large part of the whole property of a business.

**2.4 “Feasibility study of just in time inventory management on construction project” by Patil Y R, Patil D S.**

In this paper authors found that from many years the traditional way to material delivery has been used in construction industry. To stay alive inside the new competitive market, many construction firms were looking to adopt new enterprise initiatives and consequently for this to occur businesses ought to strive to create high satisfactory, low cost products that can get to the customers in the minimum time possible. Just-in-time production system is one of these initiatives that focuses on cost reduction by cutting off non-value added activities. Further in paper authors have explained how the JIT method used in a highway construction project where aim of this project is to complete 3.5 Km. as per JIT plan. Positive results of the JIT plan were concluded after completion of the project.

**2.5 “The Applicability of Just-In-Time in United Arab Emirates Construction Projects” by Mohamed Ali and Dr. Salwa Beheiy.**

Some previous research papers in context of construction industry in UAE shows that delays and overruns in construction projects in UAE are prevalent. Therefore, to find out main reasons to delays in materials delivery to construction sites in the United Arab Emirates (UAE), and to discover the applicability of the Just-in-Time (JIT) technique in the UAE construction culture to help to overcome materials delivery delays were the main aim and objective of this research paper.

To achieve this target, a proper questionnaire regarding to the many reasons of material delays and the applicability of just-in-time technique in construction industry was developed. The main aim of JIT materials management system in construction project is to optimize materials delivery timing and to minimize inventory quantities. After running the analysis, one result extracted from the survey is that a large portion of respondents agreed that JIT can be applied in United Arab Emirates Construction Projects. This gives a positive sign that Just-in-Time (JIT) can assure construction fluidity in terms of managing materials procurement process in construction projects.

**2.6 “Just in Time application and implementation for building material management” by Akintola Akintoye.**

In this paper author explained the JIT approach to total business functions in the form of a flow chart. After that an overview of JIT in which main features of JIT such as minimum inventory, minimum work in progress, relationship between the supplier and contractor, quality management has been discussed briefly. What type of material, who supplies these material and what would be the best distribution system are the three prominent factors need to be taken in account while checking the applicability of JIT to building material management. In the conclusion section of paper authors stated that JIT implementation requires trust and discipline on the part of the contractor and supplier. And henceforth author gave the series of benefits of JIT such as improvement in communication, increment in inventory turnover, building up long term relationship with vendors.

**2.7 “The application of the Just-in-Time Philosophy in the Chinese Construction Industry” by Low Sui Pheng and Gao Shang.**

In this research paper, authors have given an idea about the role of construction industry in China. Main aim of the thesis was proposing proper recommendations for the strong implementation of JIT technique within Chinese construction industry. To achieve this goal authors have suggested the structure of study on JIT for the Chinese construction industry. Current condition of the construction industry in China with respect to productivity of the projects, quality aspect, profitability has also been discussed in paper. Also authors have explained that conclusion from three completed case studies. Those case studies are JIT in site layout, JIT in precast concrete construction and ready mix concrete industry in China. Conclusions obtained has been taken in account to design the final framework for JIT implementation in the Chinese Construction industry. Hence in final section of the paper authors has concluded that there is potential for JIT application in China’s construction industry having proper assistance of the Chinese Government.

**2.8. “Why Indian industries fail to implement JIT- an analysis” by Balu P, Moorthy R**

Authors found that, Indian Industries has got great power to face the challenges before the world market, but because of some reasons they lack to face these challenges. JIT means that during flow process, the right material produced in proper amount and hence delivered at right time. JIT practices can help the Indian industries to come to be more competitive in global market. This paper states the critical factors like Vendors relationship, Labour cooperation and top management involvement as well as their commitment could have been the reason for the non-implementation of JIT. If these were tried at the right level, then Indian industries will stand high in global market.

### **III. SIGNIFICANCE OF JUST-IN-TIME TECHNIQUE IN CONSTRUCTION INDUSTRY**

The Just-in-Time technique is an effective management technique that can determine the success or failure of any construction project. This technique manages the flow of materials, components, tools and associated information regarding ongoing project.

The benefits of imposing a JIT technique have an effect on all entities contained in supply chain management. Implementing of JIT concept leads to efficiency, to viability and it is a societal good. Just-in-Time (JIT), or Zero-Inventory-Policy (ZIP), is a manufacturing and delivery technique with a goal of usually minimizing and casting off any kind of waste or excess. JIT endeavours to accomplish smooth generation by giving, the right materials, in the right amounts and quality, just in time for production, and by assuring that the materials are delivered to the site on the actual day of use or the day earlier than. Successful implementation of Just-in-time technique could be capable of lessen numerous elements such as inventory level, storage space, manufacturing unit overhead, manufacturing costs, rectification works so that it will lead to improvement in quality. Therefore, it's very important for everyone involved in construction project to understand the objective, the fundamental of Just in Time method and his or her roles in order to ensure a successful implementation of JIT system.

### **IV. BARRIERS TO ADOPT JUST-IN-TIME PRACTICES IN CONSTRUCTION INDUSTRY**

Despite the fact that JIT as theoretical idea appears to be wonderful, there are some obstructions in getting this idea work in all actuality and get JIT implemented appropriately. Some of the barriers that may arrive while adopting the JIT technique are listed below:

1. JIT requires visit set ups, shipments and receipts.
2. The JIT framework must work effectively and worker must carry out their activity right.
3. JIT depends on participation and trust between individuals, specialists, supervisors, providers, clients and so on.
4. The idea of JIT must be seen completely in a similar importance by all concerned and after that endeavor usage.
5. Implementing JIT is frequently extremely costly, when the preparation, preventive upkeep and counselling costs are calculated in.
6. Implementation of JIT must be balanced because reducing stock beyond a certain point may cause more harm than good.

### **V. CONCLUSION**

As one can see, various research papers proposed different strategies for implementing JIT in Construction Industry. From this literature survey one can conclude that even if manufacturing industries and construction firms are different kinds of production systems but a JIT technique can also be applicable to construction. Hence it can be concluded that, in various construction projects, use of just-in-time technique will improve project's productivity, improve work flow, and project durations will shorten. Successful implementation and execution of just-in-time technique would be able to diminish a few elements such as stock level, capacity space and generation costs. By using JIT principle, we can maintain quality of the entire project and increase efficiency of the workers.

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