

Material Management in Construction Industry – A Review

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Abstract- Construction industry is very vast and is bifurcated into many areas such as building, bridges, roads and highways, railways, tunnels, dams and bandharas, etc. Every project is unique and every decision related to control on expenses is unique too. Cost of material for the project is more than 50%. So we have to focus on material management. Material management is not limited to control on waste but it started from supplier's selection to quality of materials, its price, requirement as well as availability, financial strength, its transportation and storage too, etc. like lots of factors have included in it. This paper presents the review on how material management has been done in construction industry.

Keywords – Material management; construction industry; Inventory control

I. INTRODUCTION

Construction industry is very vast and is bifurcated into many areas such as building, bridges, roads and highways, railways, tunnels, dams and bandharas, etc. Every project is unique and every decision related to control on expenses is unique too. Cost of material for the project is more than 50%. [1] So we have to focus on material management is necessary. Material management is not limited to control waste but it started from supplier's selection to quality of materials, its price, requirement as well as availability, financial strength, its transportation and storage too, etc. like lots of factors have included in it.

Kanimozhi and Latha (2014) have been presented definition of material management such as coordinating function responsible for planning and controlling material flow. [2] They have also presented five processes in material management such as planning, procurement, logistics, handling and waste control process. On the basis of that they has developed a software on Microsoft excel and they applied in four various companies and the result was labor productivity improved by 6% with additional lot of various benefits such as better handling of material, reduction in duplication orders, improved project schedule, better field material control as well as relations with suppliers, quality control, reduce surplus material on site as well as shortage and better cash flow management.

Thomas et al. (2005) has been presented the definition of site material management is the allocation of delivery, storage, handling, spaces and resources for the purpose of supporting the labor force and minimizing inefficiencies due to congestion and excess material movement. [3] They have also present principles of site material management such as semi-permanent storage area, staging area, workface storage area, vendor relations, deliveries, etc. Do not store material close to building, locate parking area, marked stored material, material should be stored to permit easy access and retrieval as well as stored on timber or pallets etc. includes in principles of semi-permanent storage area. Principles of staging area has present reserve areas next to the building for materials deliveries and backfill around the building as quickly as is practical to permit the area to be used as a staging area. The principles of workface storage area includes the amount of material stored inside should be kept minimum, integrate the sequence of work with the storage plan so interior space can be used without interfering with the work, task like unpacking, cutting reshaping etc. should be done away from the workface, maintain good housekeeping as well as arrange removal of waste. Vendor relations and deliveries includes whenever possible erect deliveries directly from the delivery trucks, assure deliveries are properly as sequenced as make sure delivery rate from vendor is well-suited with the installation rate of the field team. General principles has includes avoid the use of earthen ramps into below grade areas and make use of elevators.

Caldas et al. (2014) has been said material management is an integrated process that consists of the people, organizations, technology and procedures used to effectively identify, acquire, accelerate, inspect, transport, receive, store and preserve the materials, equipment and associated information across the life cycle of a capital

project. [4] They also said the goal for the same is to ensure that the correct quality and quantity of material and equipment are procured in an effective manner, obtained at a reasonable cost and available when needed. They did the two types of questionnaire survey in 114 organizations. In survey first questions were related to materials management personnel, various components related to material management in the organization, material requirement planning, its purchasing, its quality assurance as well as control, its transportation and logistics, material management on site, etc. In survey second detailed information related to material management functions as well as current and forecasted issues affecting global procurement and materials management. From the deep study by researchers they have been given some recommendations related to the same such as Early project planning should include global market studies, project planning should include the emerging topics of sustainability, the refinement and standardization of interfacing among IT systems offers great potential for improvement, managers should address quality issues proactively in global sourcing by planning to import from qualified suppliers or developing the local supply base to achieve desired quality standards before the start of the project and last but not least was the volatility of the markets during the first decades of the 21st century has taught so many things to materials management professions; the importance of this specialized knowledge should be stressed to corporate strategies planners as much as possible.

II. THEORY

Said and Rayes (2010) has been presented the critical planning decision of material supply and material storage on construction site. [5] The proposed model has been bifurcated into two main models such as supply logistic and site logistics. Supply logistic model attention on planning on material supply which includes the ordering cost, carrying cost and shortage cost and site logistics model attention on site layout planning for material storage areas including construction temporary facilities. They have been well represented how to minimize the ordering cost, carrying cost and shortage cost. Ordering cost is a combination of purchasing cost and delivering cost. Purchasing cost decreases with the increase of order quantities because of the saving of supplier administration cost and the provision of discount rates. Order larger quantities automatically decreases delivery cost due to proper utilization of available trucks capacity. Carrying cost includes interest on investments, insurances, taxes, depreciation, deterioration and obsolescence and which could be minimized by frequent material deliveries with short ordering periods especially for expensive and valuable materials. Shortage cost incurred to contractors due to belated material deliveries and the shortage of material when needed. Frequent material deliveries are more unguarded to delays than longer ordering periods. Site logistic model represent the optimize layout cost by material handling cost, relocation cost and travel cost in construction area which could be minimized by proper layout planning.

Barrige et al. (2005) has been said to efficient and effective inventory control system in manufactured housing industry needs three ingredients such as generators of quick information flow, generators of quick material flow, and facilitators of both information flow and material flow. [6] While making Material requirement planning (MRP) framework for the same, first solve the questionnaire such as (a) what do I need to purchase? (b) When do I need the material? (c) How much do I need to buy? (d) When do I need to buy them? And (e) where will I buy them? They have been presented the MRP framework and which depends on three levels such as level 1 was Database (Administrator), level 2 was MRP Inputs and outputs (Users) and level 3 was MRP reports. Administrator includes material records such as material description and lead time, supplier's records such as its supplier's names, phone number, fax number etc. and house type such as material quantity. Level 2 such as Users which includes inputs and process flow. Inputs means house type, quantity for it, its production date and material holding time. Process flow was a step-by-step process to use inputs such as material need, purchasing need and purchase order. Level 3 was MRP reports includes the information provided by the users and identifies the relevant information about material requirement quantities, purchasing dates, purchasing orders etc. With the help of these systems they have presented the comparison between conventional material requirement planning system and proposed MRP system which is very effective and advantageous on conventional material requirement planning system.

Zheng et al. (2015) has been presented a philosophy of construction materials supply chain under vendor managed inventory (VMI). [7] In VMI model the information flow such as builder provides market information and demand to the chosen suppliers, suppliers is responsible for refilling inventory in the storerooms prearranged by the builder and the demand forecast feedback send to the builder, and both parties make the decision in order and maintain mutual coordination and cooperation.

III. IN PRACTICE

Zeb et al. (2015) has been said, material related issues can escalate the project cost and if all construction material handled with care automatically increase in profit in high level. [8] They did questionnaire survey in Pakistan in building project only and they have noted five important factors such as difficulty in managing materials among sub-contractors due to the limited storage space on-site, difficult to store materials on site due to insufficient space available, conflict among sub-contractors due to acute space available for material, limitation to

work progress due to improper stocking of material and difficult to coordinate sub-contractors material on site. First and forth factor could be solve by practicing Just in time (JIT). To solve second factor contractor and subcontractor could be arrange an additional warehouse nearby project for required material. Role of project manager play a significant role to solve third factor. And to solve fifth factor prime contractor could be appoint subcontractor on labor rate.

Keitany et al. (2014) has been present case study on role of material management in performance of organization by using stratified random sampling technique in various departments such as production, quality control, human resources development, store, finance, audit, distribution center etc. [9] Data has been collected from structured questionnaire and the result was coefficient correlation between inventory control system and organization performance was 0.884. Co-relation between lead time and organizational performance was 0.451 and strongly positive correlation between lead time and inventory control system was 0.940. The proposed scheme is tested using ordinarily image processing. From the simulation of the experiment results, we can draw to the conclusion that this method is robust to many kinds of watermark images.

IV. CONCLUSION

The work has been done on review related material management in construction industry. So many researches have been done work on it. But due to every unique construction project we need to study of every factor for each project and from these efforts we could be save as well as proper utilization of money in construction industry as per our priorities.

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