Influence of Material Management on Construction Project

Raj Desai [1], Prof. Dixit Patel [2]

[1]M.Tech Student, Department of Civil Engineering, Parul University, Gujarat, India
[2]Assistant Professor, Department of Civil Engineering,Government Engineering College, Gujarat, India

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Abstract- *Material management in construction industry is a key for successful undertaking, running and completion of any construction project. This review paper is based on the analysis of the influence of the material management on the construction project which is possible by identifying common factors for the building construction. One of the main difficulties in delaying construction projects is improper materials and equipment management. In this study, factors affecting effective material management and cost overrun listed in accordance with the most affecting factors based on literature review. Therefore the proper management of this single largest element can improve the output and price efficiency of a project and help ensure its timely completion.*

Key Words: **Material ,Management, Influence, Project delay, Cost Overrun**

1.INTRODUCTION

The construction industry is without a doubt a very important constituent of a country's economy. Construction is regarded as a mechanism of generating employment, and offering opportunities to millions of workers. Therefore it plays an essential role in socio-economic development of a country. The main issue faced by construction industries in developing countries is the project delay and cost overrun caused due to improper material management.

Materials management incorporates arranging and material take off, merchant assessment and determination, acquiring, use, delivery, material getting, warehousing and stock and material appropriation. By proper material management project delay and cost overrun can be minimized.

2. REVIEW OF LITERATURE

Antony et al. (2017) studied that even though the materials and components used in construction costs more than 60% of the project cost in total, methods that exists for managing them totally depends on human skills. In this methodology, they said that the combination of Near Field Communication (NFC) and Global Positioning System (GPS) technologies are used which can facilitate low cost, easy to implement solutions to identify and track materials and components. This system is fully automatic and provides effective identification and tracking in all phases like production (offsite), enroute (transportation), construction site (onsite). This technology helps in obtaining real time and accurate information about the construction resources. It also helps in sharing the information with all the players of the project immediately. This approach uses the combination of NFC and GPS as a powerful portable tool which enables to collect, store, share and reuse of field data accurately, completely and almost instantaneously.**[1]**

Satyanarayana et al. (2017) stated that Materials are basic core organs of any product it occupies around 60 to 70% of total cost of production. Materials management will attempt resolve the issues viz., materials shortages, delays in supply, price fluctuations, damage and wastage, and lack of storage space. After analysis, they concluded that the materials are managed in a series of stages such as procurement, transportation, Shipping, grading, storage, warehouse maintenance, supplying to production centers Etc. Minimizing the risk at all the above levels give management not only better utilization of resources but also serves as competitive advantage. **[2]**

Vignesh et al. (2016) stated that it is important to improve the decision making process in supply chain process. However, they do not know how to improve the decision-making in supply chain process in relation to the needs of the organization. Analytical Hierarchy process (AHP), a multi attribute decision analysis method is used with a view to providing solutions for two issues. First to find out the importance of factors which affect the decision making process in construction supply chain process. Second, based on the factors importance, which Performance measures need to be account for accurate decision making during material management process can be found out. In this study critical factors which cause great impact in the specific decision was found, this provide not only the most cost effective solution, but the solution could better serve the contractor needs at that particular instant. **[3]**

Mallawaarachchi et al. (2015) stated that Construction projects are always expected to create a balance between cost, time and quality. It is possible to have high quality and low cost, but at the expense of time, and conversely to have high quality and a fast project, but at a cost. Therefore, the purpose of this research is to investigate the importance of quality for construction project success. Moreover, poor quality could lead to unnecessary cost to the organization where it could

create costs due to failure, appraisal and prevention. Implementing proper quality management plan is important at the project inception where, quality drawings, quality standards and constructability of design may lead to enhance the project quality. **[04]**

Ashokkumar et al. (2014) stated that the development of construction industry depends on the quality of construction projects. Quality is one of the critical factors in the success of construction projects. This project mainly focuses the importance and factors that affects the quality management in the execution (construction) phase. He concluded that the main factors, which affect the construction quality and increase in cost of construction due to quality defect. This study will create the quality management awareness to all level construction companies' especially small-scale companies. He get the major factors and issues which affects the construction quality and that create a chance for find out the remedial measure. This thesis is useful for minimize the material wastage, workmanship wastage, time wastage and indirect cost. **[05]**

Sindhu et al. (2014) stated that Inventory management system involves procurement, storage, identification, retrieval, transport and construction methods. The first part based on conducting questionnaire survey in various construction companies. In second part, analyzing those results by using Statistical Package for Social Sciences SPSS. ABC analysis is one of the conventionally used approaches to classify the inventories and the case study of a company is collected. They were focused some points mainly in Construction Industries: Involvement of contractor in material management, Need for stock management, managing stock in growth of company, Importance to stock comparing other works, Maintaining safety in storing. **[06]**

Keitany et al. (2014) stated that the Materials management is a device to improve execution in meeting client benefit prerequisites in the meantime adding to productivity by limiting expenses and making the best utilization of accessible assets. The primary target of the investigation was to evaluate the part of materials management on authoritative execution. In particular, the examination expected to survey how stock control frameworks and lead-time influence hierarchical execution. The evaluations demonstrated that stock control frameworks assumed a crucial part in authoritative execution, and accordingly, associations must guarantee that stock control framework be very engaged with material management exercises consequently accomplishing higher hierarchical execution. The outcomes additionally demonstrated that the coefficient relationship between's stock control frameworks and authoritative execution is 0.884. **[07]**

Lenin et al. (2014) stated that a void created by the absence of proper materials management on construction sites. Research has shown that construction materials accounts for 60-70% of the total cost in construction projects. Material mismanagement decrease the contractor's profit leading to huge losses, and leaving the project in big troubles, therefore the proper management of this single largest component can improve the productivity and cost efficiency of a project and help ensure its timely completion.The results obtained from the ranking factors shows that the top five major is causes of cost overruns are design issues, market condition, store issues, contractor issues and external issues. They obtained conclusions are given: Identifying variables influencing construction time and cost overruns shows that, design issues, client issues, contractor.**[08]**

Georgekutty et al. (2012) found that the Construction project execution in India is yet confronting challenges. For the most part projects taken up for usage will never entire,in time or finish at a later stage leaving expense and time invade. Specialists are endeavoring to discover the reasons why projects could not finish in time. They inferred that the way that not very many project are all around arranged before execution and projects are constantly influenced time overwhelm because of a few reasons. Materialscontribute over 60% of the aggregate project cost. So material management and control is a difficult issue. This examination work is an endeavor to discover a strategy to control the acquirement and conveying cost in construction projects. **[09]**

Patel et al. (2011) stated that a void created by the absence of proper materials management on construction sites. Research has shown that construction materials and equipment may constitute more than 70% of the total cost for a typical construction project. One of the major problems in delaying construction projects is poor materials and equipment management. They concluded that there should be a centralized material management team co-ordination between the site and the organization, Proper control, tracking and monitoring of the system is required, Awareness and accountability should be created within the organization. **[10]**

3. Major Findings from the Literature Review

1. Storage issues have been a well-known problem among the construction professionals.

2. The Materials management processes require a transformation to improve the overall in handling of materials for more efficiency and effectiveness on the construction site.

3. The increasing complexity and uncertainty, project delivery is not only management of three project constraints: cost, scope and time, but perceive it to be an assessment of the uncertainty within which the project is operating and its continuing ability to respond to the reason why it was needed in the first place.

4. There is the need to track and manage materials on all construction projects. SMEs do not undertake detailed site activity planning because of lack of people, skills and finance.

5. The study revealed that one of the problems local contractors face is obtaining finance that is to be used in the procurement of the building materials. The source of materials was also a problem they faced.

Material Management factors in Construction Project
I. Material Identification Phase
Undefined Scope
Lack of Communication
Incomplete Drawing
Lack of Conformance
Nonstandard Specification
Incomplete Meeting
Difference between Plan and Specification
Incorrect Estimation of Material
II.Vendor Selection Phase
Uncontrollable Bid
Incomplete proposal filled by vendor
Non-Qualified Suppliers
Incompetence By Supplier
III.Procurement Phase
Remaining Available Material
Available Material Quality Problem
Poor Communication
Lack of Conformation
Delay in Unrealistic dates
Re-handling of material
Storing Material
Theft of Material
Damages accrued at storage
Burglary, Theft and Vandalism
IV. Construction Phase
Incorrect Type of Material
Incorrect Size of Delivery Done
Incorrect Quality Delivered
Keeping Track of Material
Storage of Material Problem
Loss of Material
Damage of Material
No Supplier Quality Assurance
Poor Communication with Vendor
Receiving, Handling & Storage
Poor Material Handling
Poor Supervision and delay in giving Instructions
Labour Strike

Sr .No	Reference Representatives	Factors that influence Cost Overrun
1	Antony et al. (2017)	Near Field Communication (NFC) and Global Positioning System (GPS) technologies are used which can facilitate low cost, easy to implement solutions to identify and track materials and components.
2	Satyanarayana et al. (2017)	Materials are basic core organs of any product it occupies around 60 to 70% of total cost of production.
3	Vignesh et al. (2016)	It is important to improve the decision making process in supply chain process.
4	Mallawaarachchi et al. (2015)	Construction projects are always expected to create a balance between cost, time and Quality.
5	Ashokkumar et al. (2014)	The advancement of development industry relies upon the nature of Development ventures.
6	Sindhu et al. (2014)	Stock is imperative particularly in development venture, as the best possible measure of stock will guarantee that all development exercises will have the capacity to do as indicated by the arranged calendars.
7	Keitany et al. (2014)	Void made by the nonattendance of appropriate materials management on development locales.
8	Lenin et al. (2014)	Stock management framework includes acquirement, stockpiling, distinguishing proof, recovery, transport and development techniques.
9	Liwan et al. (2013)	To keep this circumstance it is frequently important to commit imperative assets like cash, work force, time, and so forth.
10	Phani et al. (2013)	The fundamental issue of obtainment is identified with plan postponements and absence of indicated quality for the Undertaking.
11	Georgekutty et al. (2012)	For the most part extends taken up for usage will never entire, in time or finish at a later stage leaving expense and time overwhelm.
12	Meghani et al. (2011)	Development, 4-M (Material, Manpower, Money, Machine) assume critical part.
13	Patel et al. (2011)	Void created by the absence of proper materials management on construction Sites. Delaying construction projects is poor materials and equipment Management.
14	Flanagan et al. (2009)	Little and medium measured ventures (SMEs) speak to a vast piece of the development area.

4. CONCLUSIONS

From the literature review it is very clear that material management plays a very important role in construction projects. Material management needs to done irrespective of the size of the firm. Material Management plays its part from the purchasing of material to its utilization. The following factors that are brought down from the literature are the ones that directly affects the construction project. Mismanagement of these factors may lead to project delay or cost overrun.

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