

# AN ASSESSMENT OF ROLE OF MATERIAL MANAGEMENT IN CONSTRUCTION PROJECTS

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**Abstract** - Material management is a term used to imply "controlling the kind, amount, location, movement and timing of various commodities" used in production by various industrial enterprises. Material Management is the process of organizing, guiding, controlling and coordinating those activities concerned with materials and inventory requirements. Material Management plays an important role in enhancing the productivity in construction projects. The effective management of materials should be considered at all phases of construction projects. It is important for planning and controlling materials in order to make sure that the right quality and quantity of materials are appropriately provided in a timely manner, obtained at a reasonable cost and are available when needed.

**Key Words:** Material Management, Inventory, Construction Projects, Materials, Planning,

## 1. INTRODUCTION

Bailey et al. (2009) define materials "as the goods purchased from sources out of the organization that are used to produce finished products". Materials used in engineered structures are known as building materials or construction materials. Construction materials are classified as bulk materials, bagged materials, palletted materials and packaged materials.

Material planning includes calculating, ordering and scheduling of materials required. It was founded that planning is a very crucial process to increase the productivity, profitability and to optimize the project completion time.

In the present scenario, the material cost constitute about 60-70% of the total cost of construction. The objectives of material management include procurement of materials at low rate, keeping the department expenses low, developing good supplies and maintaining good relations and records. Hence it is essential to maintain a centralized material management team coordination between site and the organization. The material wastage need to be minimized during construction in order to avoid the loss of profit for construction industries. Mishandling of construction materials affects the overall performance of construction projects in terms of time, budget, quality and productivity. The construction industry.

## 1.1 STAGES IN MATERIAL MANAGEMENT

The various stages in effective material management are:

- 1) Material Planning
- 2) Purchasing
- 3) Inventory control and warehousing
- 4) Receiving, Inspection and dispatching
- 5) Value Analysis
- 6) Logistics
- 7) Disposal of scrap and material preservation

## 1.2 FACTORS AFFECTING MATERIAL MANAGEMENT

Following are the various factors affecting effective material management:

- 1) Plan and design complexity
- 2) Fund availability for payment
- 3) Price fluctuations
- 4) Lack of storage
- 5) Poor communication
- 6) Site conditions
- 7) Wrong handling of materials
- 8) Weather condition
- 9) Wastage and existence of unnecessary materials on site

## 2. LITERATURE REVIEW

**Vikram Kulkarni et.al., (2017):** This study is carried out to fill the voids created by the improper material management on construction sites. Materials constitute over 70% of the project cost and may affect overall project cost if not managed properly. The study describes the case study of nine different small, large & medium firms in Maharashtra. The methodology adopted for data collection in this study was questionnaire survey. For this study total of nine firms (3 small, 3 medium, 3 large) were selected randomly in the

Maharashtra region of India. The data gathered from the questionnaire survey was arranged and studied properly. According to gathered data it was found that there were few flaws in the material management systems of all three sizes of construction firms which affect the material management. From this survey it was observed that only large firms use typical protocol & software for material management, hence they faced minimum problems. On the other hand medium & small firms lack behind in material management as they don't use any software or they are not aware of material management techniques. Top management should pay more attention towards material management.

**P.Ezhilmathi et.al., (2016):** In this study material management plays a vital role in the construction field. Whether it is a small firm or large firm the material management should be done. The effective materials management plan enhances an institutional master plan by filling in the gaps and generating an environmentally liable and resourceful outcome. Materials management can deal with planning and building design for the movement of materials, the acquisition of spare parts and replacements, quality control in purchasing and ordering parts, and the standards involved in ordering, shipping, and warehousing the required materials. Better construction management is required for optimizing resources and maximizing productivity, efficiency and complete project on time. Material management holds a part right from purchasing of materials till its utilization. Moreover the S curve analysis should be done to check the deviations in the planned process to avoid the delay of the project. In case of delay, EOQ analysis is recommended to complete the project efficiently within stipulated time and cost.

**Hemishkumar Patel et.al., (2015) :** Construction materials usually constitute a major portion 50-60% of the total cost in a building construction project. Materials management is made problematic by materials shortages, delays in supply, price fluctuations, damage and wastage, and lack of storage space. To manage a productive and cost efficient site efficient material management is very essential. Inventory management system involves procurement, storage, identification, retrieval, transport and construction methods. A questionnaire based survey was used to judge the attitude of Contractors, Project Engineers, Store In charge and Site Supervisors towards factors affecting Material Management of construction firms in the Gujarat region. Results indicated that the most important factor affecting Material management and Inventory management of construction firms are Misunderstanding of owner's requirements by design engineer, Poor quality of materials, Unclear and inadequate details in drawings, Poor use of advanced engineering design software, Poor quality site documentation, Underestimation of complexity, Mistakes and delays in project design documents, Design errors, Lack of materials (due to closure), Poor response from the consultant team to contractor inquiries..

**Pauline JerutoKeitany et.al., (2014):** Materials Management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. The basic objective is to ensure that the right item is bought and made available to the manufacturing operations at the right time, at the right place and at the lowest possible cost. The study established that there was a positive and significant relationship between inventory control system and lead time on organizational performance. This implies that through inventory control systems and lead time in materials management, an organization can achieve the benefits of effective use of labour, providing system flexibility, increasing productivity, decreasing lead times, reduction in wastes, reduction in production costs, increased product quality are achieved.

**Jacklyne Bosibori Otundo et.al., (2015) :** Inventory management remains a significant challenge for county governments in relation to timely provision of high quality service to the public; forums have been organized across counties with the intention to foster an exchange of ideas around various issues including specialty products, new technologies, and reducing supplier risk from supply chain inadequacies and management of inventories. The purpose of this study was to evaluate the effects of inventory management practices on the operational performance of counties with particular interest of operations in Kisii country, Kenya. The study established that supply dependability affect operational performance to a moderate extent 44.7%, effects of inventory categorization in terms of inventory for customer service is rated as the most influential on operational performance and free flow of order fulfillment of supplies, reduced inventories and timely replenishment of inventory to user departments influenced operational performance. The study recommends that procurement and supplies teams in the county should monitor demand forecasting of inventory for efficient operational performance and service delivery to the general public.

**Carlos H. Caldas et.al., (2014):** Materials management is a critical component of the construction industry. As such, organizations need to understand the effects of proper materials management techniques on the effectiveness of project execution. It describes a study in which the purpose was to identify materials management techniques that reflect current and emerging practices in the capital projects industry. Over the years, materials management has become a critical component of successful project execution. It has earned strategic value, and organizations have become conscious of the many benefits that effective materials management practices can drive, including reduced costs, higher productivity, warranted quality, increased reliability, and added value. Through the literature review, surveys, and case studies, the authors collected data from 53 organizations. This extensive data collection effort allowed the identification of modern and effective materials management practices, as well as emerging trends and

concerns for the industry. The study clearly showed a dramatic increase in the maturity, formality, and systematization of the approach to materials management by construction organizations.

**P.Lenin et.al.,(2014):** This paper aims to fill a void created by the absence of proper materials management on construction sites. The materials on a project can represent anything from 50% to 60% of the cost of the work, so minimizing procurement costs improves opportunities for reducing the overall project costs. Poor materials management can result in increased costs during construction.. The objective of the study is to identify the variables influencing material procurement and inventory which affects the construction time and causes cost overruns. The questionnaire was developed to identify the significance impact level of the factors that causes cost overruns in building construction projects from the specialist and experts in the construction industry. Twenty six numbers of issues were selected initially for the proper assessment of most critical factors.. Based on the analysis, Identifying variables influencing construction time and cost overruns shows that, design issues, client issues, contractor issues, site issues, labour and equipment issues, store issues, external issues, market condition issues are responsible for cost overrun of building construction projects are described.

**Mohammed Al-Khalil et.al., (2004):** A measurement of the effectiveness of the material management process is needed in order to analyse problems, suggest solutions, and assess the impact of modifications to the process. Such measurement is also required for any benchmarking effort. Research was conducted to apply a set of key effectiveness measures on 17 on-going industrial projects. This research showed that most of the measures were easily obtainable, but some were difficult to obtain. Research also showed that it was possible to obtain the highest score on all measures, indicating that best practice in industry is achieving highly successful results. In this study there are two objectives, the first was to measure the effectiveness of material management processes in construction projects. And the other is a secondary objective to establish benchmarks for material management processes from the results of the projects under study. The data were collected after obtaining approval of owners and contractors and with the cooperation of project managers. Several site visits were made to discuss the research objectives and to reach a common understanding of the required data. Later visits were made to collect the required data and to discuss the findings.

**T. Phani Madhavi et.al., (2013):** In this study is to understand about all the problems occurring in the company because of improper application of material management. Material is the main component in construction project.

Therefore, if the material management is not properly managed it will create a project cost variance. Project cost can be controlled by taking corrective actions towards the

cost variance. Therefore a methodology is used to diagnose and evaluate the procurement process involved in material management and launch a continuous improvement was developed and applied. The experimental analysis consists of theories and practical consideration of the concepts. Therefore, the present work was classified as Analysis of site and management, Analysis on Inventory controlling, Analysis on purchasing procedures, Analysis on Procurement and Tracking, Analysis on costs.

**Dr. Kevin Aku Okorochoa (2013) :** A research to find out the factors affecting material management. For that he had selected a case study of selected building sites, in IMO state, Nigeria. Usage of right materials in the right place at the right time is important for effective execution of a building project. Data collected were analysed by statistical analysis through multiple regressions. This study on the evaluation of materials management strategies in the Nigerian construction industry. Questionnaires were used to collect data from the construction participants. Adequate materials requirement planning and handling are critical to efficient materials management in construction sites and successful construction project delivery in Nigeria. Storage process system although important in construction site, does not play a critical role in successful materials management in Nigeria construction industry. The cost associated with over storage and handling in construction sites can be minimized through efficient materials requirement planning. The research concluded that Material management leads to effective cost control, to improve the quality and time execution of their projects and reduces failure of a project.

**NannLwinPhu et.al., (2014):** In this study, construction material management can be viewed as three categories which are measures for effective material management in building sites, factors that increase waste in building sites and problems related with material management. The principal tool used for collection of data is quantitative survey (numerical values); questionnaires for field survey. Data for the study are obtained through a structured questionnaire administered to respondents in number of 53. The respondents involve 18 project contractors. The data are analysed by the use of inferential statistics; including Relative Importance Index (RII) and the perceptions of project engineers, site engineers and contractors are tested to determine whether there is a significant degree of agreement among respondents by Kruskal Wallis test or H test. The overall results of this study indicate that the current practices of material management in local construction projects need systematic and effective control. Based on the findings of agreement analysis, it is found that the perceptions of three respondents (project engineers, site engineers and contractors) are identical in all three cases; measures for effective material management, factors increasing waste in building construction projects and problems related with material management. Hence, it is said that all of project engineers, site engineers and contractors are mainly concerned with material

management and their roles and decisions are essential to improve effective material management.

### 3. CONCLUSIONS

Studies and discussions were done to review the role of construction material management, inventory control techniques in construction projects. Effective material management helps to avoid project failure on various fields of construction industries, delays of works on site and reduce any extra cost for a project across the globe based on the various journals collected. The definitions of material management and its importance in construction projects were also discussed in detail.

This paper had identified and discussed various factors affecting effective material management. It was found that the industries employing proper material management system have increased their overall efficiency by 35%. Hence the research suggests that it is essential to employ a centralized material management team for the success of the project.

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