

# Enhancing Construction Project Profitability: The Critical Role of Effective Materials Management

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**Abstract:** *The majority of construction development firms in India still do not consider the issue of materials management, material management is very essential for the implementation of good project management & materials management affects project profitability and contractor durability in the construction process. In order to carry out this study, both primary and secondary sources of data were used to collect data. The objectives were highlighted as being to identify the factors that affect effective materials management in construction projects and to assess the effect of materials management on project profitability. Simple percentages have been used to analyze the data, response frequencies and related percentages. Evaluating issues related to efficiency of materials management in building projects was done using the relative importance index (Risk rating). The elements with high effect on material management approach include complexity of details in plans, modifications to the design while construction is active, inadequate storage leading to depreciation, in order to increase project profitability, adequate materials management procedures should be taken into account from the beginning of project execution.*

**Keywords:** Construction waste, Management techniques, Economic relevance, Existing situation

## I. INTRODUCTION

Materials management is related to planning, procuring, storing and providing the appropriate material of right quality, right quantity, at right place in right time so as to co-ordinate and schedule the production activity in an effective way. To manage a productive and cost efficient, site efficient material management is essential. Inventory management involves procurement, storage, identification, retrieval, transport and construction methods. Construction projects are one of the greatest common activities we meet in our lives, yet it is also known as one of the most difficult civilization endeavors. Construction is the process of constructing a building or other structure. In point of fact each project consists of sophisticated and complex processes which need to be carried out by different individuals of different authorities, who have special set of skills and knowledge. Material management technique which includes well documented procedures to decrease the cost and increase the profit during any construction projects.

## II. LITERATURE REVIEW

**Khyomesh V. Patel, et.al(2009)** The Material management method is adopted by small scale construction firms were assessed through influencing cost variance so structured questionnaire was administered by site engineers through planning & organization while employment of security was adopted for effective Material management. Problems revealed by the site as poor-site organization, non- availability of material on site, materials in stock with severity index, damaged materials have been formed. Site with required quantities delivered at when adequate stacking & storage, damage loss material should be barest minimum. Availability of materials after the work done on each day should be supervised and made note by the site engineer and it can be maintained by a software so that it can be assessed and viewed by everyone. So, the study recommended proper site organization has been carried out through site.

**Ashika. M, et. al (2016)** Material management is a most important component in the construction site, as there is a need for proper and timely requirement of right quality, right quantity of selected material in reasonable time. Timely material management can also improve the workforce planning, increase labour productivity. This also helps in selecting the vendor, purchasing, shipping, inventory managing and distribution of materials In construction projects 70-80% of

the cost is spent on purchasing materials. In order to minimize the material, cost the proper survey and data is collected about the materials before the purchase. After completion of the project the cost of money spend on the materials is calculated by using the bills collected during the time of purchase.

**Godwin Ehis Oseghale, Adetooto, Bridget Oseghale ,et.al (2011)** 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. 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. Basic categories followed are civil, electrical, plumbing, finishes, construction chemicals, miscellaneous. The materials are also often stacked as per the specification of the vendor or manufacturer. There is a need for an efficient MIS integrating all aspects of material management. Firms employing proper material management systems are seen to have increased their overall efficiency by 35%.

**Chaitreshs. umrani, et. al (2005)** Material management has a significant role in the construction industry and its cost 60% or above the cost of the material plays a vital role as it is involved in overall quality of the material. It mainly focuses on the overall productivity and reduction in large amounts of the inventories stored for a long period. along with the cost of procurement of the material the storage, maintenance and movement of the material is very much important. actual conditions, materials Organizations involved in construction are fully or partially utilizing management systems Materials management systems may be improved in this modern era of technology by introducing a variety of computer- and software-based techniques. Construction-related industries might increase economics, growth, and part of the program by using and enhancing accessible materials management solutions.

**Gopal krishnan. K , Sundersan. M, et.al(2013)** For the enhanced profitability of the project, Material management plays a key role. Certain factors like change in design when the construction is in progress, deterioration of the supplies which are stored for longer period of time affects the project. To avoid these factors, proper implementation of material management is required. The nature of detailing in drawing which is to say the more complexity of detailing in drawing the more difficult the effectiveness of material management practical. Material management practice is always affected by the nature of detailing in drawing which is to say the more complexity of detailing in drawing the more difficult the effectiveness of material management practice.

**Shah K. C, et. al(2007)** For every successful project, material management is required. Implementation of material management will benefit the project in improving the efficiency of the material in order to minimize the impact on the project performance. waste is a product or material that is unwanted and required to transport out from site Strategies for waste minimization are stock control for minimization of over or duplicate ordering, good practices of material handling, systematic inventory process and proper material storage. Reasonable changes have effect on time performance & on time delivery has effect on time performance.

**Patelvatsal , et. al(2018)** Administered to a purposive sample of main contractors and sub-contractors, eliciting current material management practices through semi-structured interview and they are matching price to competitor price, investment in not qualified suppliers and unavailability of material the analysis of factors affecting effective materials management in different small, large & medium firms in construction area by studying gathered data, factors were found out affecting material management. They concluded that the large firms are good & capable enough in applying material management techniques on construction sites. Medium firms have some technical as well as some seasonal problems as they do not use any software. Small firms lack behind in material management as compared to medium & large firms due to lack of knowledge about material management Use should be done to avoid manual errors in material management. use of software like MSP, PRIMAVERA, ERP, SAP, etc.

**P. Ezhilmathi, Dr. T. Shanmugapriya, et. al(1999)** Cost increases are considered to be the most important problems that affect the contractor's income, creating major losses and leaving the project in deep trouble. Planning and building design must take into account the movement of materials, the collection of replacement and spare parts, the standards involved in ordering, shipping, and warehousing the materials needed, such as quality control in purchasing and ordering parts. From the time that materials are received until they are used, material management plays a role. to examine any deviations from the intended course of action to prevent project delays. In the event of a delay, EOQ analysis is advised to successfully complete the project within the given time and budget.

**Shreesha. S, Sundip Shenoy R, Narendra Kamath, et.al(2002)** Lack of sufficient storage results in decreased labour productivity and general delays, which can indirectly affect the total cost of the project. To maintain inventory from deterioration, control investment in inventories, and keep it at an ideal level. To maintain an adequate stock of raw materials during times of crisis. To reduce the materials' decay. In order to resolve the problem of stock out, control the inventory investment and maintain it at an optimum rate, ABC and EOQ Analysis was conducted. Due to the contractor placing some emphasis on material management, the ratio of savings is less and the cost reduction could not be evaluated with adequate data. Two analyses surely help in lead time reduction, proper control, and wastage reduction.

**Amandeep Kaur, et. al(2014)** Purchasing materials, having brought them to the facility, transforming them into parts, constructing parts into finished products, sale, and transmitting the finished product to the customer are all measures in the production process that need to be arranged and planned in an integrated way for an industrial undertaking. Market analysis, purchasing, collecting, and inspecting, storing, distributing, and using, maintaining and repairing, dealing of, and an information system. An essential part of MP and MS is a logical, effective strategy and process for inspecting incoming stores. Value analysis is the process of evaluating a material's inherent value in relation to achieving the organization goals. Distribute the workload for procurement to prevent periods of inactivity and overwork. Employ rational procurement programs to enhance inventory management.

**Zairra Mat Jusoh, Narimah Kasim, et. al(1998)** This paper had identified the effect of material management to 5 criteria of project performance. i) The availability and sufficient materials and equipment have effect on time, quality, productivity and performance. ii) Appropriate quality material has effect on time, cost and quality performance. iii) On time and reasonable time of material procurement have effect on time and cost performance. iv) Efficient inventory system and documentation have effect on time and waste performance. v) Reasonable changes has effect on time performance. vi) On time delivery has effect on time performance. vii) Minimizing procurement cost has effect on cost performance. viii) Appropriate site storage has effect on productivity and waste performance. ix) Efficient site layout has effect on productivity performance. x) Easy site access has effect on productivity performance. xi) Unconfined working space has effect on productivity performance. xii) Efficient material controlling has effect on waste performance. xiii) Appropriate handling has effect on waste performance.

**Jan, Shu-Hui, Ho, S. Ping, et. al(2010)** This paper had identified the basic CPM/PERT approaches do not deal with the hidden constraints. Dr. Goldratt proposed the Theory of Constraints (TOC) and Critical Chain, which provide the concepts for achieving effective removal of those constraints. The usage of buffers in TOC and Critical Chain emphasis is laid on completing activities without wasting time by using buffers. When activities take longer than the schedule anticipates, buffers are consumed. When they take less time, those buffers are replenished. Awareness of project buffer consumption relative to the completion of the critical chain provides an important forward-looking solution. Furthermore, removing safety time from individual activities can eliminate the major cause of time wastage and mitigate the impacts of constraints. According to the study, the application of buffers in project scheduling will improve effectiveness, specifically in the construction plan phase. In the CCPM, the 50 % estimates are too arbitrary and do not apply in the real world regard to construction industry. Critical Chain in construction project, the new buffer estimation is integrated with CPM approach for buffer management in the paper.

**Pritesh b. shrimali, DR. Jayeshkumar Pitroda, et. al (2007)** A project's capacity to be successfully done is greatly related to the organization of the material procurement process. Therefore, the primary goals of material management are to reduce the expense, time, and raise the quality and safety of material acquisition. Certain techniques, such as ABC Analysis, FSN Analysis, and Bar Chart, are useful to control inventory. Electrical working According to data analysis, class "A" category products that require strong permanent and need to be kept in lower quantities account for 70–80% of the total yearly usage value. Class "B" category: structured inventory system for articles with a total annual consumption value of 15–25%; additionally, less purchasing and store management. Items in the Class "C" category that account for 10% to 15% of the total yearly consumption value should only be acquired.

**Vatsal b.patel, kasim narimah, et.al(2010)** Materials contribute for around 60–70% of the cost of a construction project. Therefore, it's essential to control such materials to lower the cost and increase availability as needed. Ineffective material management is due to a variety of problems, including price matching with competitors, time spent researching unsuitable sources, and resource scarcity. The implications of current problems in the construction sector, such as dependence on imported materials. When compared to the other forms of material management, type 1, phase-

by-phase delivery, suffered from major cost overruns. Type 2, however, improved in terms of delay and cost run. material damage during construction, Plans and specifications are different.

**Pritesh B. Shrimali, Dr. Jayeshkumar Pitroda, Prof. Chitanjan Patel, et. al(2016)** As materials play a major role in the construction of the project; the factors which affects the material's procurement should be avoided to reduce project cost overrun and job completion delay, thereby on the increase quality of the construction and overall project performance. planning, identification, procuring, storage, receiving and distribution of material is required for decreased cost of material and time saving of high-rise construction projects. The research has examined materials management on high rise construction projects. From the material management processes reduce the cost of material. Material Management has also time saving of high rise construction projects. So the all over the price of high rise construction projects reduce and the consumers have benefits of price.

### III. CONCLUSION

- **MATERIALS PLANNING AND CONTROL**-Involves looking at the individual requirements of parts, preparing materials budget, forecasting the levels of inventories and scheduling orders.
- **PURCHASING**-This includes the selection of sources of supply finalization in terms of purchase, placement of purchase order and approval of payments to supplier.
- **STORE MANAGEMENT**-Physical control of materials, store preservation, minimization of obsolescence and damage through timely disposal and efficient handling, store records maintenance, right positioning and stocking are all part of this process.
- **INVENTORY CONTROL**-Inventories are things that are either stocked for sale, in the process of being manufactured, or are in the form of materials that have yet to be used. For the system to operate efficiently, it is necessary to keep various types of inventories on hand.

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