



## Material Management in Constuction Industry

### KEYWORDS

Construction Materials, Materials Management, factors effecting material management, Material management software.

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**ABSTRACT** *Materials management is defined as a coordinating function responsible for planning and controlling materials flow. In a detailed view, materials management is a planned procedure that comprises the purchasing, delivery, handling and minimisation of waste with the aim of ensuring that requirements are met. Materials management is an essential function that improves productivity in construction projects. Hence, the efficient use and management of material have an important influence on a company's profit and can avoid delay in construction. To managing a productive and cost efficient site efficient material management is very essential. Research has shown that construction materials and equipment may constitute more than 70% of the total cost for a typical construction project. 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. One of the major problems in delaying construction projects is poor materials and equipment management.*

*This paper describes the factors effecting material management in construction company and based on the factor to develop construction materials management software that suits construction companies.*

### INTRODUCTION

Materials management is a process for planning, executing and controlling field and office activities in construction. The goal of materials management is to insure that construction materials are available at their point of use when needed. The materials management system attempts to insure that the right quality and quantity of materials are appropriately selected, purchased, delivered and handled on site in a timely manner and at a reasonable cost. Materials management is the system for planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of materials are properly specified in a timely manner, are obtained at a reasonable cost and most importantly are available at the point of use when required. Thus Materials management is an important element in project management. Materials represent a major expense in construction, so minimizing procurement costs improves materials management can result in increased costs during construction. Efficient management of materials can result in substantial savings in project costs. If materials are purchased too early, capital may be held up and interest charges incurred on the excess inventory of materials. Materials may deteriorate during storage or get stolen unless special care is taken. Delays and extras expenses may be incurred if materials required for particular activities are unavailable. Ensuring a timely flow of materials is an important concern of material management. For effectively managing and controlling materials, the

performance of materials management should be measured. A performance measure calculates the effective working of a function. These performance measures may differ from system to system. The measures divide the materials

management system in parts and make the working of the system more efficient. When joined, the measures make the complete materials management system.

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improves productivity in construction projects. Hence, the efficient use and management of material have an important influence on a company's profit and can avoid delay in construction. In this study, materials management are categorised to 5 processes, namely

1. planning,
2. procurement,
3. logistics,
4. handling, stock
5. waste control processes.

#### Planning

Materials planning includes quantifying, ordering and scheduling. It is stressed that planning is especially significant in terms of increasing productivity, profit, and facilitating the timely completion of construction project. Hence, productivity will suffer if the material planning process is not executed properly.

#### Procurement

Procurement is described as the purchase of materials and services from outside organisations to support the firm's operations from production to marketing, sales and logistics As such, a detailed material schedule and co-ordination of the procurement and order of material are important in assuring material availability

#### Logistics

Generally, logistics is a concept that emphasises movement and it may include planning, implementing, and controlling the flow and storage of all goods from raw materials to the finished product to meet customer requirements. There is evidence that the routing of materials is one of the main points which affect cost and time during construction projects

#### Handling

Materials handling is described as a broad area that encompasses virtually all aspects of all movements of raw materials, work in process, or finished goods within a plant or warehouse. Nearly 50 % of the production cycle time in many industries is spent on handling materials. Due to that, poor material handling may result in delays leading to the idling of equipment.

### Stock and Waste Control

Stock control is classified as a technique devised to cover and ensure all items are available when required. Stock control can include raw materials, processed materials, components for assembly, consumable stores, general stores, maintenance materials and spares, work in progress and finished products. It is of great importance that the bulk of construction materials delivery requires proper management of stock control. Meanwhile, construction activities can generate an enormous amount of waste and materials waste has been recognised as a major problem in the construction industry. However, tighter materials planning can reduce waste and can directly contribute to profit-improvement and productivity. Each processes stated above plays an important role for an effective materials management. However, there are materials management issues that have not yet been tackled effectively. The following section will highlight on the current materials management problem faced in the construction industry.

### OBJECTIVES

- ❖ To identify the factors effecting material management in construction company such as
  - Efficient materials planning
  - Buying or Purchasing
  - Procuring and receiving
  - Storing and inventory control
  - Supply and distribution of materials
  - Quality assurance
  - Good supplier and customer relationship
  - Improved departmental efficiency
- ❖ To develop construction materials management software that suits construction companies. This software was developed based on survey results, literature review, the experience of the researcher and other experts in construction materials management.

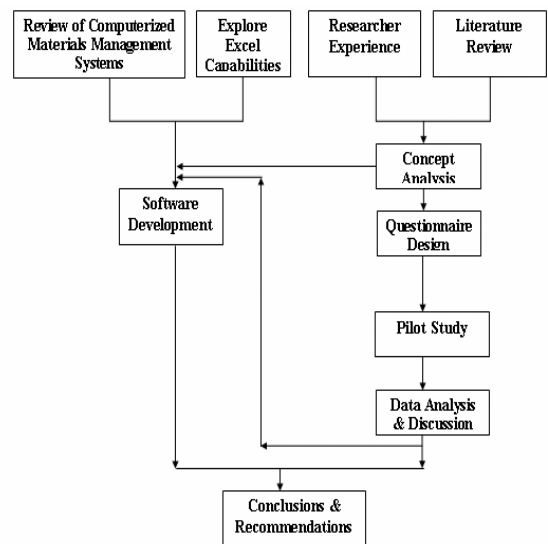
### LITERATURE REVIEW

- [1] Neeraj et.al.[2010] has expressed that approximately 42% of Indian government-funded construction projects are facing time overruns. In an earlier study conducted by one of the authors, A second-stage questionnaire survey based on these factors was used to identify the significant schedule performance factors. The analysis of the survey responses led to conclude that factors such as: a project manager's competence; monitoring and feedback by project participants; interaction between external project participants; and good coordination between project participants.
- [2] Heon [2011] has stated construction scheduling techniques often generate schedules that cause undesirable fluctuations in resource utilization levels and unintended peak resource demands that exceed availability limits. On the other hand, resource allocation or resource constrained scheduling models are designed to resolve resource conflicts by rescheduling project activities while minimizing the extension in project duration.
- [3] Fan [2011] states that scheduling delay is a common worldwide phenomenon in construction projects.
- [4] Hegazy and Menesi (2008) found that scheduling delays occurred in 70%, 40% and 50% of government contracted construction projects in the United Kingdom, India and United Arab Emirates (UAE) respectively.
- [5] Anderson [2005] has commented the research focused on engineering projects, typically complex and large in size since they are through likely to offer more comprehensive coverage and evidence of project management practices that can be transferred to smaller projects.
- [6] Ibbs [2007] expressed that project delays caused damages to direct and indirect cost. Most of the previous research is based on construction projects in developed countries. In recent years, the Indian construction industry has witnessed the arrival of impending projects related

to infrastructure development, airport expansion, metro rail, and power sectors.

- [7] Love [2000] states that field overhead damages require proper estimation, even though it is less complicated than home, office overhead charges.
  - [8] Saka, and Mudi. [2007] observed that most of the contractors of Nigerian construction companies, collected materials locally, instead of collecting them from suppliers.
  - [9] Hisham [2010] Material procurement and storage on construction sites need to be properly planned and executed to avoid the negative impacts of material shortage or excessive material inventory on-site. Deficiencies in the supply and flow of construction material were often cited as major causes of productivity degradation and financial losses. Efficient planning of materials procurement and storage on construction sites can lead to significant improvements in construction productivity and project profitability. Overlooking these critical interdependencies between material procurement and site-space availability can lead to serious project problems including material shortages, improper storage, poor and unsafe site layout, and productivity losses. (Jang et al. 2007) Accordingly, there is a pressing research need to investigate and model the critical interdependencies between material procurement and material storage decisions. The objective of this paper is to present the development of a construction logistics planning (CLP) model that is capable of integrating and optimizing critical planning decisions of material procurement and material storage on construction sites.
  - [10] Said et.al. [2011] explained that Material procurement and storage on construction sites need to be properly planned and executed to avoid the negative impacts of material shortage or excessive material inventory on-site.
  - [11] Guo, [2011] states that the effective implementation of LCM in construction projects relies strongly on a visual communication and collaboration information platform ) as information sharing is the key to implementing LCM. An effective information platform is needed to gather project information.
  - [12] Orabi, et. al [2010] states that the main purpose of this model is to allocate limited reconstruction resources to competing recovery projects in order to generate a recovery schedule for the damaged civil infrastructure system.
- Bhargava1 et.al.[2010] states that Worldwide, cost and time overruns on highway projects are critical issues that adversely affect project delivery and public relations, and disrupts highway programs to overlapping activities is management of the information transfer between activities.

### METHODOLOGY



**CONSTRUCTION MATERIAL MANAGEMENT SOFTWARE:**

The software was developed using Microsoft Excel platform. This is because contracting companies are familiar with Excel and find it easy to use. To increase the capability and skills of the researcher in Microsoft Excel package, he reviewed some books explaining the use of Excel, internet Excel publications, and Excel manual. These skills increased the capability of the researcher to develop the software. The developed software was tested by four contractors asking them to try it on real projects. They were also asked to fill a questionnaire for evaluating the software

**CONCLUSION**

An effective material management system can bring many benefits for a company. Previous studies by the Construction Industry Institute (CII) concluded that labor productivity could be improved by six percent and can produce 4-6% additional savings. Among these benefits are:

- ✓ Reducing the overall costs of materials
- ✓ Better handling of materials
- ✓ Reduction in duplicated orders
- ✓ Materials will be on site when needed and in the quantities required
- ✓ Improvements in labor productivity
- ✓ Improvements in project schedule
- ✓ Quality control
- ✓ Better field material control
- ✓ Better relations with suppliers
- ✓ Reduce of materials surplus
- ✓ Reduce storage of materials on site
- ✓ Labour savings
- ✓ Stock reduction
- ✓ Purchase savings
- ✓ Better cash flow management

**REFERENCE**

- Bell, L. C. and Stukhart, G. "Attributes of materials management systems." *Journal of building industry: Maincauses and prevention.* *Journal of Construction Engineering Construction Engineering and Management.* 112(1). | 14-22, 1986. | | Dey, P. K. "Re-engineering materials management : A case study on an Indian refinery." *Business Process Management Journal.* 7. 394-408, 2001 | | Arnold, J. R. and Chapman, S. N. "Introduction to Materials Management." 5th Ed. New Jersey: Prentice-Hall. 10 (2004) | | Harris, F. and MacCaffer, R. "Modern Construction Management." London: Blackwell Science (2001) | | New Strait Times "Leverage on ICT in Construction Industry." 13 May, Malaysia, 2007. | | Sarshar M. and Isikdag, U. "A survey of ICT use in the Turkish construction industry," *Journal of Engineering, Construction and Architectural Management.* 11 (4). 238-247, 2004. | | Illingworth, J. and Thain, K. "Material Management is it Worth It?" Technical Information Service, The Chartered Institute of Building ASCOT, 93. 1-5, 1998 | | Abdul-Rahman, H. and Alidrisi, M. N. "A Perspective of Material Management Practices in a Fast Developing Economy: the case of Malaysia." *Construction Management and Economics.* 12. 412-422, 1994 | | Wong, E. T. T. and Norman, G. "Economic evaluation of materials planning systems for construction." *Construction Management and Economics.* 15. 39-47, 1997 | | Lambert, D. M., Stock, J. R. and Ellram, L. M. "Fundamentals of Logistics Management." United States: McGraw Hill. 20, 96 (1998) | | Ademeso, O.S. and Windapo, A. O. "Relationship between Material Management Approach and Scheduled Project Completion Time." In COBRA. "Conference The construction and building research of the Royal Institution of Chartered Surveyors." Dublin Institute of Technology, 2008 | | Pheng, L. S. and Chuan, C. J. "Just-in-time management in precast concrete construction: a survey of the readiness of main contractors in Singapore." *Integrated Manufacturing Systems.* 12. 416-429, 2001 | | Varghese, K. and O' Connor, J. T. "Routing large vehicles on industrial construction sites." *Journal of Construction Engineering and Management.* 121 (1). 1-12, 1995. | | Gopalakrishnan, P. and Sundaresan, M. "Materials Management: an integrated approach." New Delhi: Prentice-Hall. 189, 240 (1977) | | Prabu, V. and Baker, M. "Materials Management." UK: McGraw-Hill, (1986) | | [16] Teo, M. M. M. and Loosemore, M. "A theory of waste behaviour in the construction industry." *Journal of Construction Management and Economics.* 19(7). 741-751, 2001 |