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Effective Material Logistics in Construction Industries

Abhilin G B[1], Vishak M S[2]

[1]PG Student, Department of Civil Engineering, Sivaji College of Engineering and Technology, Kanyakumari district, Tamil Nadu, India

[2]Assistant Proffessor, Department of Civil Engineering, Sivaji College of Engineering and Technology, Kanyakumari district, Tamil Nadu, India

Abstract: ***Material management is the 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 main objective of the study was to assess the role of materials management on construction projects. Specifically, the study intended to assess how inventory control systems and lead time affect construction projects. Inventory management system involves procurement, storage, identification, retrieval, transport and construction methods. ABC analysis is one of the conventionally used approaches to classify the inventories and case study of company is collected. The model can deal with both uncertain demand and availability of supply. These findings may mainly reflect the main factors that will affect the inventory management system which able to achieve the improved efficiency of project management and to reduce the waste of materials in the respective region of construction industries.***

Keywords: Material management, Inventory control, Software use, Manual identification

1. Introduction

Material management is defined as a management system that is required in planning and controlling the quality & quantity of material, punctual equipment placement, good price and the right quality as required. Material management is a management system that integrates purchasing, shipping and material control from suppliers. Based on those definitions, generally materials management can be defined as a process of planning, executing, and controlling the right source of materials with the exact quality, at the right time and place suitable for minimum cost construction process. Capability to coordinate and integrate purchasing, shipping and material control from suppliers is required for material cost control. Three important phases that holds the key to a successful materials management are materials purchasing, materials usage, and storage. It is used to reduce the cost, which increases profitability and streamlines the production. Apart from management of material cost and its supply it helps in its proper utilization, transportation, storage, handling and distribution. Selection of personnel for marketing, purchasing, inventory control, stores management and materials handling and their training and placement is also to be seen by the materials management department in any organization to support the management in production activities. It also helps in the marketing, sales promotion and control of all the types of materials for its quality and cost. Inventory control can be defined as, "which ensures the supply of required quality of inventory at the required time and at the same time prevent unnecessary investment in inventories". The ABC (Always Better Control) inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory in construction process, while a relatively large number of items may from a small part of the money value of stores. The money value is ascertained by multiplying the quality of material of each item by its unit price. ABC analysis is a technique for prioritizing the management of inventory. Inventories are categorized into three classes – A, B, and C. most management efforts and oversights are expended on managing A items. C items get the least attention and B.

2. Objectives

The aim of this research project is to develop mechanism to improve materials management on construction projects. The specific objectives of the research include. To review existing literature on materials management processes in construction project. To review current industrial practice in materials management and to establish key problem areas and elements of good practice. To establish the requirements for integrating materials management and resource modeling in project management systems. To investigate requirements necessary for effective use of the system, such as skills and knowledge requirements.

3. Literature Review

A thorough study was carried out along with study of cases surveys and interviews to professionals involved in this area. As a result, a methodology for diagnosis and improvement was proposed and tested in selected projects. Effective construction materials management is a key to success for a construction projects. 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 approaches to classify the inventories and the case study of a company is collected. The tracking and locating of materials in construction jobsites has increase a great concern among construction entities. The improper handling and storage of materials in construction site has made it difficult to track and locate materials when the time they are needed. To maintain sufficient stock of raw materials in period of

short supply, to protect inventory against deterioration and control investment in inventories and to keep it in an optimum level an inventory control techniques such as ABC analysis etc is carried out in second phase of study to overcome the problems of stock out.

4. Research Methodology

For every construction industry material is required. In construction projects material constitute major cost. Generally the cost of materials contains 50% to 60% of total cost of the project. In construction projects, material management is carried out to minimize wastage of material, shortage of material, damage of material, lack of storage space and delay in supply. The construction industry struggles with low profit margins and needs to increase productivity to lower production costs and increases profit. Material management is a scientific technique, concerned with planning, organizing and control of flow of materials, from their initial purchase to destination. Material management contains mainly 4 processes i.e. planning, procurement, logistic and inventor for management of a productivity and cost efficient site, efficient material management is very essential. Therefore the proper management of this single largest component can improve the productivity and cost efficiency of a project and help to ensure its timely completion. One of the major problems in delaying construction projects is poor material management. The material 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. During any construction project the three inter-related factors of time, money, and quality need to be controlled and managed. Successful completion of projects requires all resources to be effectively managed. It was planned to collect the feedbacks from various stakeholders of construction industry's from Thiruvananthapuram city of Kerala state of India. The survey has included Contractors, Labors and Developers. This research work includes use of ABC inventory control system both software and manual.

5. ABC Inventory control

Control of inventory is exercised by controlling individual items, which is called stock keeping units. In controlling inventory, four questions must be answered:
1) What is the important of the inventory item?
2) How are they to be controlled?
3) How much should be ordered at one time?
4) When should an order be placed?

The ABC inventory classification system answers the first two questions by determining the importance of items and thus allowing different levels of control based on the relative importance of items. The ABC principle is based on the observation that a small number of items often dominate the results achieved in any situation. This observation was first made by an Italian economist, Vilfredo Pareto and is called Pareto's Law. The ABC inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory in construction process, while a relatively large number of items may from a small part of the money value of stores. The money value is ascertained by multiplying the quality of material of each item by its unit price. Inventory control can be defined as, "which ensures the supply of required quality of inventory at the required time and at the same time prevent unnecessary investment in inventories". The ABC (Always Better Control) inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory.

5.1 Steps in ABC analysis

The procedure for classifying by annual amount usage is as follows:
1) Establish the item characteristics that influence the results of inventory management. This is usually annual amount usage but may be other criteria, such as scarcity of material.
2) Classify item into groups based on the established criteria.
3) Apply a degree of control in proportion to the importance of the group.

The factors affecting the importance of an item include annual amount usage, unit cost, and scarcity of material. The procedure for classifying by annual amount usage is as follows:
1) Determine the annual usage for each item.
2) Multiply the annual usage of each item by its cost to get its total annual amount usage.
3) List the items according to their annual amount usage.
4) Calculate the cumulative annual amount usage and the cumulative percentage of items.
5) Examine the annual usage distribution and group the items into A, B, and C groups based on percentage of annual usage.

5.2 ABC Analysis

Table 1: Data specifications of an 3500sqft house

Item	Annual Demand	Cost/ Unit
Steel	1400 kg	45
Cement	1400 packets	390
Sand	6300 cft	50
Aggregate 20mm	4725 cft	35
Normal bricks	35525 nos	7
Tile	4550sqft	40
paint	630lit	250

Table 2: Category finder

Item	Annual Demand	Cost /Unit	Annual Cost	% of Cost	Category
steel	1400kg	45	63000	3.76	C
Cement	1400 packets	390	546000	32.55	A
Sand	6300 cft	50	315000	18.78	B
Aggregate 20mm	4725 cft	35	165375	9.86	C
Normal bricks	35525nos	7	248675	14.82	B
tile	4550sqft	40	182000	10.85	C
Paint	630lit	250	157500	9.39	C
Total annual cost			1677550		

A= 30% B= 20% C=10%

Percentage cost more than 20% is considered as material A, percentage of cost more than 10% and less than 20% is considered as material B, and percentage of cost less than 10% is considered as material C.

1.3 Pareto chart analysis

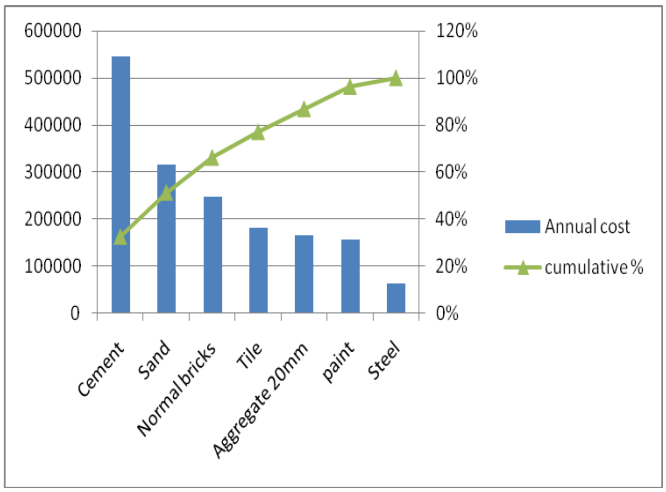
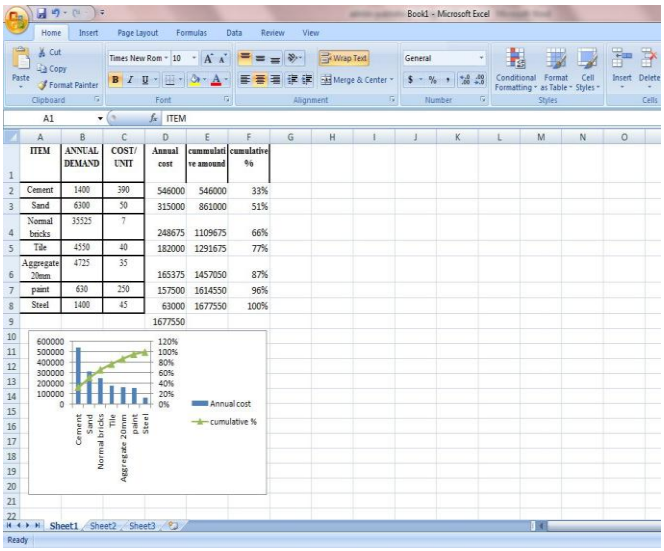


Figure 1: Pareto chart



ITEM	ANNUAL DEMAND	COST/ UNIT	Annual cost	cummulative amound	cumulative %
Cement	1400	390	546000	546000	33%
Sand	6300	50	315000	861000	51%
Normal bricks	35525	7	248675	1109675	66%
Tile	4550	40	182000	1291675	77%
Aggregate 20mm	4725	35	165375	1457050	87%
paint	630	250	157500	1614550	96%
Steel	1400	45	63000	1677550	100%
			1677550		

Figure 2: Pareto chart using Excel

The pareto principle states that for many events roughly 80% of there effects comes from 20% of causes.

2. Results

After completion of questionnaire survey, data analysis and from the proposed system analysis the following outcomes regarding material management system from the various construction companies obtained.

80% of contracting companies consider that using daily recording for used materials in the project is necessary. 40% of contracting companies, daily recording of used materials by using a form. 80% of respondents consider it is necessary in reporting the situation of materials in project's stores. 60% of contracting companies, reporting the situation of materials in the project's store usually. 60% of companies record the received materials on site by using a computerized form.

Based on ABC analysis and pareto chart analysis, percentage of cost more than 20% is considered as material A, here it contributes 10%. Percentage of cost more than 10% and below 20% is considered as material B. percentage of cost below 10% is considered as material C. The pareto chart states that for many events roughly 30% of their effects comes from 20% of causes.

3. Conclusions

Generally material management is carried out manually in construction companies. But to achieve a profit, there is need to change process of material management. By using ICT technique, exact consumption of material, stocked material, and location of material can be obtained. It reduces manual error and it is easy to communicate. The survey results show that contractors, in general, are interested in using many tools of managing construction materials. However, most contractors did not actually apply some tools and techniques of construction materials management, such as

- Creating data for materials categories, local suppliers, international suppliers, and materials cost.
- Updating data for local suppliers, international suppliers, materials cost when change, and using internet for knowing the new materials and its prices.
- Providing a list of materials in project, providing material cards at site store, and recording the received materials on site.
- Most contracting companies manage construction materials using non computerize forms. Shortage of suitable construction materials management software is considered the main obstacle to computerize material management processes.

References

[1] S.Sindhu, Dr.K.Nirmalkumar, V.Krishnamoorthy (2014) "*Performance Analysis of Inventory Management system in construction Industries in India*"
[2] Ashwini R. Patil, Smita V. Pataskar (2013) *"Analysing Material Management Techniques on Construction Projects"*
[3] T. Phani Madhavi, Steve Varghese Mathew, Roy Sasidharan (2013) *"Material Management in construction"*
[4] Gulghane, Prof P.V.Khandve (2015) *"Management for construction materials and control of construction waste in construction industry: A review"*
[5] Narimah Kasim, Siti Radziah Liwan, Alina Shamsuddin, Rozlin Zainal, and Naadira Che Kamaruddin (2012) *"Improving on-site materials tracking for inventory management in construction projects"*
[6] Goodrum, P.M.McLaren, M.A & Durfee.A (2006) *"the application of active radio frequency identification technology for tool tracking on construction jobsites"*
[7] Handanhal Ravinder, Ram B Mishra (2014) *"ABC analysis for inventory management: bridging the gap between research and classroom"*

Author profile

Mr. Abhilin G B holds a Bachelor of Engineering (BE) in Civil Engineering. She is currently a PG student of Mater of Engineering (ME) in Construction Engineering and Management, at Sivaji College of Engineering and Technology, Manivila, Kanyakumari Dist., Tamil Nadu, India.

Mr. Vishak M S holds a Bachelor of Engineering (BE) in Civil Engineering and Master of Engineering (ME) in Construction Engineering and Management. He is currently the Assistant Professor of Civil Engineering at Sivaji College of Engineering and Technology, Manivila, Kanyakumari Dist.,TamilNadu,India.