A Study of Material Management System in Construction Industry

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Abstract – Material management system involves procurement, storage, identification, retrieval, transport and construction methods. Each is indelibly linked to safety, productivity and schedule performance. The main objective of our research is to analyze the Material management control adopted and the effective utilization of Material at the construction site. ABC analysis is one of the conventionally used 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. These findings may reflect the main factors that will affect the Material 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: Study, Material, Management System, Construction, Industry.

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1. INTRODUCTION

The term Material refers to the goods or materials used by a firm for the purpose of production and sale. It also includes the items, which are used as supportive materials to facilitate production. Nearly 60% of money is allotted for the Material in a project. Material constitutes one of the important items of current assets, which permits smooth operation of production and sale process of a firm. Material management is that aspect of current assets management, which is concerned with maintaining optimum investment in Material and applying effective control system so as to minimize the total Material cost. 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 integrative way for an industrial undertaking. Material Management is simply the process by which an organization is supplied with the goods and services that it needs to achieve its objectives of buying, storage and movement of materials. Material is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. Material management is the supervision of non-capitalized assets (Material) and stock items. A component of supply chain management, Material management supervises the flow of goods from manufacturers to warehouses and from these facilities to point of sale. A key function of Material management is to keep a detailed record of each new or returned product as it enters or leaves a warehouse or point of sale.

1.1 Material Management

Construction material constitutes a major cost component in any construction project. The total cost of installed material may be 50% or more of the total cost. The goal of material management is to ensure that the materials are available at their point of use when needed hence, efficient procurement of material represents a key role in the successful completion of the work. 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. Extensive literature and reports deplore the lack of efficiency and productivity in the construction industry. Too often, construction projects suffer from delays, budget overruns, and claims. A properly implemented materials management program can achieve the timely flow of materials and equipment to the jobsite, and thus facilitate improved work face planning, increased labor productivity, better schedules, and lower project costs.

2. METHODOLOGY

Methodology can be defined as systematic and purposive investigation of facts with an objective determining the effective relationship among such facts and research between two or more phenomena. The questionnaire survey method was administered to collect data. The respondent have been ask to express their opinion on the variable at 5-point scale, ranging from strongly agree to strongly disagree. Furthermore the questionnaire item drawn from different sources and condent validity of the questionnaire has been checked by consulting with experts and a modification has been made in the questionnaire to suit the requirement of the study.

2.1 Analysis of Site and Management

The analysis was done to understand what are all the problems occurring in the company because of improper application of material management. The solutions that provided in this work. may cost a lot in the beginning, but it will help the company in the long run by providing solutions to the key problems like lack of specification, delay, improper procurement etc. According to the problems that generally occur in the site due to the improper material management, was categorized each problem and created a cause-effect diagram, where factors such as, Material, purchase, procurement, were all generally addressed to procurement cycle. For this purpose, the study was done by visiting the site. Site survey was done and prepared questionnaires accordingly and problems to each above mentioned groups were analysed and solutions thus were given. From the questionnaires prepared and the answers thus obtained from them were categorized into each class of problems. From those classes it was understood that lack of technological implications and scientific approach were lacking with respect to the procurement process. Thus the problems were pointed out to them and they agreed to each above mentioned problems that were occurring in their site and thus corrections would be implemented by them in their next oncoming projec

2.2 Analysis on Material Controlling

In the Material process, the methodology adopted was preparing questionnaires and allocating marks for each, by categorizing them into each of their subsystem problems, such as supply, materials and equipments, weightages were given substantially. Then, based on this the solutions were offered in the form of cause – effect diagram and flow charts, graphs were also prepared, depicting problems such as delay, lack of specification, excess and lack of inspection.

2.2.1 Material Planning

Production planning requires purchase and Material.Planning decisions for an organization to control expenses and finances.To get the purchase benefits, discounts, reduced transportation and ordering cost the bulk purchase may be economical. Material of such materials is stored for longer time

2.3.1 Abc Analysis

This is most popular Material control technique adopted as Pareto‘s Law. Large amount of capital is invested in purchase of costly items in small number. Eighty percent of the cost of materials purchased is required for only Twenty percent costly items for efficient Material control in stores where the large number of materials are to be handled, the classification of them is necessary to take particular care of costly items, which are less in number. The ABC analysis is commonly used in most of the organizations.

3. MATERIAL MANAGEMENT

Material management is the practice overseeing and controlling of the ordering, storage and use of components that a company uses in the production of the items it sells. Material management is also the practice of overseeing and controlling of quantities of finished products for sale. Successful Material management involves creating a purchasing plan to ensure that items are available when they are needed — but that neither too much nor too little is purchased and keeping track of existing Material and its use. Two common Material-management strategies are the just-in-time (JIT) method, where companies plan to receive items as they are needed rather than maintaining high Material levels, and materials requirement planning (MRP), which schedules material deliveries based on sales forecasts.

3.1 Different Types of Material

Material of materials occurs at various stages and departments of an organization. A manufacturing organization holds Material of raw materials and consumables required for production. It also holds Material of semi-finished goods at various stages in the plant with various departments. Finished goods Material is held at plant, FG Stores, distribution centers etc. Further both raw materials and finished goods those that are in transit at various locations also form a part of Material depending upon who owns the Material at the particular juncture. Finished goods Material is held by the organization at various stocking points or with dealers and stockiest until it reaches the market and end customers. Besides Raw materials and finished goods, organizations also hold inventories of spare parts to service the products.

3.2.3 Maximum Level

Maximum level is the level above which stock should never reach. It is also known as ‗maximum limit‘ or

maximum stock‘. The function of maximum level is essential to avoid unnecessary blocking up of capital in inventories, losses on account of deterioration and obsolescence of materials, extra overheads and temptation to thefts etc. This level can be determined with the following formula.

Maximum Stock level = Reordering level + Reordering quantity — (Minimum Consumption x Minimum re-ordering period)

3.2.4 Maintaining Perpetual Material System

This is another technique to exercise control over Material. It is also known as automatic Material system. The basic objective of this system is to make available details about the quantity and value of stock of each item at all times. Thus, this system provides a rigid control over stock of materials as physical stock can be regularly verified with the stock records kept in the stores and the cost office.

3.3 Factors Considered In Material Management System

3.3.1 Cost Factors

Differentiation of currency prices has been ranked by the owner’s respondents in the 4th position. It has been ranked by the consultants‘respondents in the 3rd position and by the contractors‘respondents in the second position. It is not surprising to find out differentiation of currency prices is more important for contractors than for others because this factor affects contractors' profit rate and cost performance. The cash flow of a project has been ranked by the owners‘respondents in the second position. It has been ranked by the consultants‘respondents in the 4th position and by the contractors‘respondents in the 3rd position. Cash flow is more important for owners and contractors than for consultants, because it can give an important evaluation for the owners' and the contractors' cost performance at any stage of project. Material and equipment cost has been ranked by the owners‘respondents in the second position, but it has been ranked by the consultants‘and the contractors‘respondents in the 5th position. This indicates that this factor is more important for owners than for others. Material man, equipment cost is one of the project cost components that affects owners' liquidity and project budget.

3.3.2 Time Factors

According to owners, consultants, and contractors, the average delay because of closures leading to materials shortage was the most important performance factor, as it has the first rank among all factors with RII = 0.941 for owners, 0.896 for consultants, and 0.943 for contractors. Local construction projects suffer from complex problems because of closures leading to materials shortage. These problems can be considered as an obstacle for time performance of projects.Unavailability of resources as planned through project duration has been ranked by the owners‘respondents in the 3rd position. It has been ranked by the consultants‘respondents in the 2nd position and by the contractors‘respondents in the 3rd ane. This factor can be considered as important for 3 parties and scores a similar rank from all of them. This factor directly affects the project performance such as time. If resources are not available as planned through project duration, the project will suffer from the problem of time performance. Average delay in payment from owner to contractor has been ranked by the owners‘, consultants‘, and contractors‘respondents in the 3rd position.

3.3.3 Quality Factors

Unavailability of personnel with high experience and qualifications has been ranked by consultants‘and contractors‘respondents in the first position and by owners‘respondents in the second one. This factor is very important for 3 parties because availability of personnel with high experience and qualifications assist them to implement their project with a professional and successful performance. Participation of managerial levels in decision making has been ranked by the owners‘, consultants‘, and contractors‘respondents in the 4th position. This factor scored the same rank from all parties because sharing the managerial levels with decision-making will lead to better implementation and performance of a project and will satisfy the 3 parties to a greater degree.

3.3.4 Productivity Factors

Sequencing of work according to schedule has been ranked by owners, consultants, and contractors in the first position. This factor is the most important one for 3 parties because sequencing the work according to schedule assists them to conduct a project according to scheduled time for project completion. Management-labour relationship has been ranked by owners‘and contractors‘respondents in the 2nd position and by consultants‘respondents in the 3rd one.

3.3.5 Client Satisfaction Factors

Leadership skills for project managers have been ranked by owners‘, consultants‘, and contractors‘ respondents in the 1st position.This factor is the most important one for 3 parties because leadership

skills for project managers affect the degree of project performance and client satisfaction. Number of reworks has been ranked by owners', consultants', and contractors'respondents in the 5th position. This factor has the same rank for 3 parties because number of reworks affects the relationship between them. Numbers of disputes between owner and project parties have been ranked by owners'respondents in the 2nd position and by consultants'and contractors'respondents in the 4th position. This factor is more important for owners because disputes between owner and project parties will affect relationships between them and the degree of client satisfaction will be affected.

3.3.6 Regular and Community Satisfaction Factors

Neighbours and site condition problems have been ranked by the owners'and contractors'respondents in the 1st position and by the consultants'respondents in the second one. This factor is more important for owners and contractors because it is strongly related to client satisfaction and contractors'performance. Quality and availability of regulator documentation has been ranked by the consultants'respondents in the 1st position and by the owners'and contractors' respondents in the 2nd position. Quality and availability of regulator documentation is more important for consultants because it affects the performance of consultants and community satisfaction.

3.3.7 People Factors

Belonging to work it has been ranked by the owners, consultants, and contractor's respondents in the first position. This factor is the most important one for 3 parties because belonging to work usually improves productivity and performance of project. Iyer and Jha (2005) are in agreement with our result as this factor is important for three parties because belonging to works improves productivity and performance of a project. Employees' motivation has been ranked by the owners'respondents in the 2nd position. It has been ranked by the consultants'respondents in the 3rd position and by the contractors'respondents in the 4th position.

4. MATERIAL MANAGEMENT SOFTWARE

Material management software is a computer-based system for tracking Material levels, orders, sales and deliveries.It can also be used in the manufacturing industry to create a work order, bill of materials and other production-related documents. Companies use Material management software to avoid product overstock and outages. It is a tool for organizing Material data that before was generally stored in hard-copy form or in spreadsheets.

4.1 Features

Material management software is made up of several key components, all working together to create a cohesive Material for many organizations' systems. These features include:

Organizing, updating and analyzing Material data are some of the features that is incorporated with quality Material management software. It becomes very easy to track and understand how long it takes to process orders or perhaps the shipping of an order as well; all of it is done with the help of Material control software. Planning a construction company's workflow is a crucial factor and it becomes much easier to maintain it if the Material management software is integrated with construction ERP.

Construction companies are often found troubled with respect to the buffer stock. With the help of a well-organized Material control module, buffer stock can be managed and estimated to meet unforeseen demands. This significantly minimizes the work interruption caused due to lack of materials.

4.1.1 Order Management

Should Material reach a specific threshold, a company's Material management system can be programmed to tell managers to reorder that product. This helps companies avoid running out of products or tying up too much capital in Material.

4.1.3 Service Management

Companies that are primarily service-oriented rather than product-oriented can use Material management software to track the cost of the materials they use to provide services, such as cleaning supplies. This way, they can attach prices to their services that reflect the total cost of performing them.

4.1.4 Product Identification

Barcodes are often the means whereby data on products and orders is inputted into Material management software. A barcode reader is used to read barcodes and look up information on the products they represent. Radio-frequency identification (RFID) tags and wireless methods of product identification are also growing in popularity. Modern Material software programs may use QR codes or NFC tags to identify Material items and smart phones as scanners.

5. MATERIAL MANAGEMENT SYSTEM IN CONSTRUCTION INDUSTRY

5.1 Materials Planning and Control

Based on the sales forecast and production plans, the materials planning and control is done. This

involves estimating the individual requirements of parts, preparing materials budget, forecasting the levels of inventories, scheduling the orders and monitoring the performance in relation to production and sales.

5.2 Purchasing

This includes selection of sources of supply, finalization of terms of purchase, placement of purchase orders, follow-up maintenance of smooth relations with suppliers, approval of payments to suppliers, evaluating and rating suppliers.

5.3 Stores and Material Control

This involves physical control of materials, preservation of stores, minimization of obsolescence and damage through timely disposal and efficient handling, maintenance of stores records, proper location and stocking. Stores are also responsible for the physical verification of stocks and reconciling them with book figures.

5.4 Material Management Techniques

Materials management is categorized to 5 processes these processes are majorly followed on construction site they are namely 1.Planning, 2.Procurement, 3.Logistics, 4.Handling 5.Waste control processes. Materials planning include quantifying, ordering and scheduling. Companies may have two major levels in planning- micro and macro level. Procurement is described as the purchase of materials and services from outside organizations. Purchasing procedure can be described as Step 1 – Material Indent, Step 2 – Enquiry to Vendors, Step 3 – Vendor Comparison, Step 4 – Vendor Selection and Negotiations, Step 5 – Purchase Order, Step 6 – Vendor Evaluation.

5.5 Control of Construction Waste

Reduction of waste can be done by practicing attitude towards Zero wastage, proper decisions at design stage, site management, proper standardization of construction materials, and Codification of the same (S. Sanmath 2011). Construction waste can also be reduced by using waste management system on project. The research design used in this project is analytical in nature and the procedure using which the Researcher has to use facts or information already available and analyze this to make a critical evaluation of the performance.

6. CONCLUSION

Quality materials should be of a greater interest for contractors in order to improve cost, time, and quality performance. For implement Material management system the remedies are, Involvement of contractor's in material management they should maintain the stock list & purchase list and the calculation of materials usage also storing materials in safety. Material management system is considered to perform a key role in an organization, which is responsible to complete the company‘s project in a specific budget within a certain period of time. It is very clear that Material management of any construction will undergo intense stress in their work environment.

7. REFERENCES

T.Subramani,(2012) "Traffic Study On Road Links and Estimate the Fund required for Identified Road Improvement Projects in Major Urban Centre", International Journal of Modern Engineering Research,Vol.2, No.3, pp. 596-601.

T.Subramani. (2014) R.Lordsonmillar., “Safety Management Analysis In Construction Industry”, International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 5), pp. 117-120.

T.Subramani. (2012) ”Cost Estimation and Identification of Transport Infrastructure facility Projects in Salem”, International Journal of Engineering and Technology, Vol.2, No.5, pp. 859 – 867.

T.Subramani., (2014) A.Sarkunam.A, J.Jayalakshmi. “Planning And Scheduling Of High Rise Building Using Primavera” , International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 5), pp. 134 - 144.

T.Subramani., N.Kanthasamy., (2014) “High End Solution For Advanced Civil Engineering Projects”, International Journal of Modern Engineering Research, Volume. 4, Issue. 6 (Version 3), pp. 49-53.

T.Subramani., P.Anitha., S.Sekar., (2014) “Health-Care Waste Management System”, International Journal of Engineering Research and Applications, Vol. 4, Issue 6(Version 2), pp. 255-258.

T.Subramani.,D.S.StephanJabasingh,J.Jayalakshmi. (2014) “Analysis Of Cost Controlling In Construction Industries By Earned Value Method Using Primavera”, International Journal of Engineering Research and

Applications, Volume. 4, Issue. 6 (Version 5), pp. 145 -153.

T. Subramani., P. S. Sruthi., M. Kavitha (2014) "Causes Of Cost Overrun In Construction", IOSR Journal of Engineering, Volume. 4, Issue. 6 (Version 3), pp. 1 – 7.

T. Subramani.T, P.T. Lishitha., M. Kavitha., (2014). "Time Overrun And Cost Effectiveness In The Construction Industry", International Journal of Engineering Research and Applications, Volume. 4, Issue. 6 (Version 5), pp. 111- 116.

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