International Journal of Modern Trends in Engineering and Research
www.ijmter.com
e-ISSN No.:2349-9745, Date: 2-4 July, 2015

To Study The Effective Material Management On Small Construction Projects

Shailesh Jayprakash Pagar[1], R.V.Devalkar[2], M.C.Aher[3]
[1]*Civil Engineering, N.D.M.V.P.C.O.E Nashik, ershailesh09@gmail.com*
[2]*Civil Engineering, N.D.M.V.P.C.O.E Nashik, rajanikant99@gmail.com*
[3]*Civil Engineering, N.D.M.V.P.C.O.E Nashik, madhura.aher@gmail.com*

Abstract- 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. Materials represent a major expense in construction, so minimizing procurement costs improves opportunities for reducing the overall project costs. Poor materials management can result in increased costs during construction. Efficient management of materials can result in substantial savings in project costs. Small and medium sized constructions (SMCs) represent a large part of the construction sector. Large companies have the capacity and capability to use sophisticated information technology and management technology to control the labour and materials on projects. SMCs need help to implement control systems for labour and material that will improve performance on site. The research involves investigation of the impact of effective material management for SMCs on construction sites. Consideration is given to materials' flow through the supply chain up to completion of project. Materials can represent up to 70% of the project construction cost, hence any ways to reduce wastage and improve productivity will have major cost and time benefits. Now technologies can help in the management of materials flow and benefit contractors with lower costs and clients lower prices. The aim of study is to describe how SMCs can improve their performance in materials management, to reduce their costs, and to improve the project quality through ERP system. Case study and interview along with questionnaires has been used as the research method to develop the ideas in this paper.

Keywords- materials management, cost, productivity, ERP system, construction section, storage, construction projects.

I. INTRODUCTION

Materials constitute a major cost component for any Industry. The total cost of installed materials (or *Value of Materials*) is up to 70% of the total cost. The efficient procurement and handling of material represent a key role in the successful completion of the work. Poor planning and control of materials, lack of materials when needed, poor identification of materials, re-handling and inadequate storage cause losses in labor productivity and overall delays that can indirectly increase total project costs. Effective management of materials can reduce these costs and contribute significantly to the success of the project. The control of materials is a very important and vital subject for every company and should be handled effectively for the successful completion of a project.

The company should always consider that purchase of materials is a potential cause for delay. Unavailability of materials is not the only aspect that can cause problems. Excessive quantities of materials could also create serious problems to managers. Storage of materials can increase the costs of production and the total cost of any project. When there are limited areas available for storage, the managers have to find other alternatives to store the materials until they are needed. Some of these alternatives might require re-handling of materials, which will increase the costs associated with them. Provisions should be taken to handle and store the materials adequately when they are received. Special attention should be given to the flow of materials once they are procured from suppliers. Material Management has been an issue of concern in the construction industry. 40% of the time lost on site can be attributed to bad management, lack of materials when needed, poor identification of materials and inadequate storage. Objective of the study is to study the material management system in small and medium sized construction industry and suitable ICT software for improving materials management.

II. METHODOLOGY

This study utilized a mix of explorative and descriptive approaches. In the former, the researcher has only limited knowledge of the subject area and there is a need to identify the study issues broadly, whereas in the latter the researcher shows specific characteristics and facts in the chosen problem area. Case study research with mixed qualitative and quantitative elements was deemed appropriate for this kind of study. Thus, personal visits and interviews were conducted with the executives of the firms and these were followed up by a structured questionnaire to be answered by the same executives. In this study the current material management practices are investigated. Material management is not just a concern during the monitoring stage in which construction is taking place. Decision about material procurement may also be required during initial planning and scheduling stage. Secondly during execution inventory control technique should be monitored periodically so as to maintain flow of material to avoid the delays. Basically this study is divided in two parts such as first one Qualitative analysis & second Quantitative analysis.

A survey in the construction productivity in India reveals the major causes of the lack in productivity boils down to the improper deposited material, improper material handling, improper material application and improper material deliveries. Due to the fact that the problems in materials management will be never ending, it is possible that ICT implementation may be the answer to overcome the challenge of materials management in the construction industry. The dilemmas faced in materials management can be overcome by adapting ICT-enabled solution that can help support the effective management of materials activities. A questionnaire was developed to survey non ERP-enablers in the construction industry. The questionnaire was focused on qualitative, rather than quantitative aspects of the business processes. Respondents were asked questions regarding any specific business scenarios implemented and type of scenarios that are targeted toward specificity of acquisition of information.

The questionnaire survey method was administered to collect data. Furthermore the questionnaire item drawn from different sources and consent 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. The literature survey gives an idea about the different techniques that are used for the material management system in construction companies. From the extensive literature study it is much clearer to formulate the objective of the present study and contribute directly for successful completion of the project. In particular, researches were conducted to small extent to explore about material management in construction projects. This causes impact on performance of the material management. To yield a desired performance, it is necessary to ensure the project work effectively. Questionnaire survey was conducted among construction professionals to identify their opinion towards material management system in their

organization. The obtained data is analyzed to find out the frequency of response for various factors.

III. ANALYSIS OF COLLECTED DATA

The data obtained from the questionnaire was studied to find out the reasons of effects of improper material management system. The answers from the site in-charge were compiled to study the overall effect of the improper material management. The main reason for the loss of the materials on site was improper management of materials. The actual site to study detailed cost impact was studied. The analysis was carried out on the basis of the differentiation between theoretical and actual consumption of the materials.

"Table1. Material Consumption"

No.	Particulars	Theoretical consumption	Amount	Actual on site consumption	Actual amount
1	Cement	7400	2590000	8000	2800000
2	Sand	530	938100	620	1097400
3	Metal	645	1290000	700	1400000
4	Solling stone	120	108000	176	158400
5	Stone (ucr)	30	30000	45	45000
6	Bricks	175000	875000	200000	1000000
7	Steel				
	8 mm dia	20	940000	30	1410000
	10 mm dia	15	705000	18	846000
	12 mm dia	35	1645000	39	1833000
	16 mm dia	70	3290000	78	3666000
	20 mm dia	20	940000	23	1081000
	25 mm dia	15	705000	22	1034000
8	Vetrified tiles	1350	1620000	1540	1848000
9	Grlzed vetrified tiles dado	80	80000	93	93000
10	Kota stone	9	8100	13	11700
11	Granite flooring	16	40000	18	45000
12	Kota stone for steps	72	79200	83	91300
13	Teak wood dood frame	0.12	10800	0.18	16200
14	Concrete door frame	25	10000	28	11200
15	Granite door frame	12	10500	18	15750
16	Flush door shutter	60	90000	72	108000
17	Aluminium sliding windows	210	525000	245	612500
18	Alu.ventilators	22	44000	27	54000
19	M.s.grill	232	278400	294	352800
20	Upvc pipes		0		
	15mm	60	4200	66	4620
	25mm	30	2550	43	3655
	40mm	120	13800	135	15525
	50mm	80	14400	95	17100

21	Pvc pipe soil/vent				
	75mm	20	2800	30	4200
	100mm	30	4800	40	6400
	150mm dia	60	13800	78	17940
22	Pvc rain water pipe				0
	100mm	40	6800	60	10200
	150mm	40	10400	70	18200
23	W.c.pan indian type	5	7500	5	7500
24	Europian type w.c.	5	15000	5	15000
24	Wash hand basin	10	25000	12	30000
25	Urinals	15	22500	18	27000
26	Bib cocks	10	12000	12	14400
27	Wheel valve	5	6000	7	8400
28	Pillar cock	5	7000	5	7000
29	Flush tank	10	8000	10	8000
30	Mixer	5	25000	5	25000
31	Sintex water tank 5000 litrs	1	50000	1	50000
			----------		----------
	Total material cost		**17103650/-**		**19920390/-**

IV. RESULTS & DISCUSSION

The data was collected from the questionnaire circulated to the construction sites. The answers from the questionnaire and the remarks from the site in-charge, etc are given as follows;

- There should be centralized material management system.
- The documentation should be proper the tracking of material should be regularly done.
- The PO and indent should be carefully designed.
- The inventory should be neatly maintained.
- The computerized system need to be used.
- Use of modern material management technology needs to be done, etc.

The case study from the actual construction project to understand the effect of improper material management was done. And the result was concluded according to the analytical qualitative as well as quantitative data. The study showed the 17.10% increase in the material consumption because of faulty management.

The questionnaire study gives the suitable explanation for the deficiency in the effective materials management on the site. And the case study proves the impact of faulty material management system on the cost of the project.

REFERENCES

[1] Miss. A.A.Lakade, Prof. A.K.Gupta, Prof. D.B.Desai , 'A project management approach using ERP and primavera in construction industry', IOSR journal of mechanical and civil engineering (IOSR-JMCE), *ISSN: 2278-1684, PP: 21-24*.

[2] Milorad zlatanović, 'management in civil engineering and its developing tends', the scientific journal facta universitatis, page no. 637 – 644, March 17, 1999.

[3] H. Randolph Thomas, Victor E. Sanvido, Steve R.Sanders, 'Impact of material management on Productivity—a case study', journal of construction engineering and Management Vol.115 No. 3, page no 370-384, September, 1989.
[4] By Lansford C. Bell, George Stukhart, 'Costs and benefits of materials Management systems', journal of construction engineering and management', Vol. 113, No. 2, page no. 222-234, June, 1987
[5] Paul m. Goodrum, Dong Zhai, Mohammed F. Yasin, 'Relationship between changes in material technology and construction productivity', Journal of construction engineering and managemen, Vol. 135, No.4, page no. 278-287, April 2009.
[6] By george stukhart, 'construction materials quality management', journal of performance of constructed facilities, Vol.3, No.2, page no.100-112, May 1989.
[7] R. Navon and O. Berkovich, 'Development and on-site evaluation of an automated materials management and control model', journal of construction engineering and management, Vol. 131, No. 12, page no. 1328-1336, 1 December 2005.
[8] Hisham said, and khaled el-rayes, 'Optimizing material procurement and storage on construction sites', journal of construction engineering and management, Vol.131, No.6, page no. 421-431, 1 June 2011.
[9] Khyomesh v. Patel and chetna m. Vyas, 'Construction materials management on project sites', national conference on recent trends in engineering & technology, page no. 1-5, may 2011.
[10] N.b. Kasim, C.J.Anumba, A.R.J.Dainty, 'Improving materials management practices on fast-track construction projects', association of researchers in construction Management, Vol.2, page no.793-802, September 2005.
[11] Narimah kasim, 'ICT implementation for materials management in construction projects: case studies', journal of construction engineering and project management, 2011, ISSN 2233-9582, page no. 31-36.
[12] Ashwini r. Patil, Smita v. Pataskar, 'Analyzing material management techniques on construction project', international journal of engineering and innovative technology (IJEIT), Vol.3 Issue. 4, page no. 96-100, October 2013.
[13] T. Phani madhavi, 'Material management in construction – a case study', IJERT: international journal of research in engineering and technology, page no. 400-403 **,**nov-2013**.**
[14] Narimah kasim, Siti Radzia Liwan, Alina Shamsuddin, 'Improving on-site materials tracking for inventory management in construction projects', Proceedings international conference of technology management, business and entrepreneurship, page no. 447-452, Dec 2012.
[15] Sohrab donyavi1 and roger flanagan, 'The impact of effective material management on construction site performance for small and medium sized construction enterprises', dainty, A.R.J. (Ed) procs 25th annual arcom conference, page no.11-20, 7-9 september 2009.
[16] S.sindhu, V. Krishnamoorthy, 'Performance analysis of inventory management system in construction industries in India', international journal of innovative research in science, Engineering and technology, Vol.3 Issue 4, page no.11448-11493, April 2014.

