

Appraisal of the Effects of Materials Management on Building Productivity in South East Nigeria

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Abstract

The problem of material management is one of the key issues facing the building industry in Nigeria. The activities identified in the supply channel (the sourcing and transmission of purchase orders up to control of material wastages) are considered key to materials management because they primarily affect the economy, effectiveness of material movement, productivity, optimization of profit and reduction of materials cost. The aim of this study was to identify the key areas where material management is deficient so that improvement could be made in order to increase productivity. Consequently, a survey was carried out in ten organized building sites in the South East states of Nigeria. The site engineers, managers and supervisors were engaged through both focus interviews and site to site fact findings by the researchers. The data collected formed the background of the structured questionnaires for proper analysis and recommendations. Eighty seven out of ninety questionnaires launched to the sites were properly completed and returned. In order to rank the severity of the factors, a mean score index was employed. Results show that lack of provision of material schedule, material scheduling and poor control of material wastages are the most significant areas of material management improvement. In the light of the above, it is recommended that a soundly prepared set of material schedules, carefully checked will give those responsible for material management a first rate document to form the basis of their material administrative control system. The material schedule would further assist in material scheduling – identifying materials required and making deliveries at scheduled times and dates. This, in turn helps to reduce left over materials after use, superfluous materials and subsequent improvement in building productivity.

Keywords: Materials management, material schedule, material scheduling, material waste, productivity.

1.0 Introduction

Builders have become increasingly cost conscious about their construction resources, namely; materials, labour, plant, finance and methodology. Not only has considerable attention been given to labour costs, incentive schemes and productivity but also to plant management and cost control. Has the same attention been extended to materials and their management and effects on productivity? This situation can be conveniently illustrated by likening the company resources and its organization to the human body.

Without the head there would be no effective co-ordination of the body and invariably, no existence. Likewise a company without management expertise will not survive. The importance of the legs and arms to the body are self-evident and by the same token in

the analogy the importance of both labour and plant cost is apparent as they tend to a large extent, determine the success of a contract. What about the head? It is the unifying element and to a large extent gives the body its form. Materials are as important, yet the examination of the company's head seems to have been a less frequent occurrence than other parts of the body. Why is this so? When for many firms, materials not only represent a significant part of their administrative effort but also a substantial part of their expenditure. Chetna (2011) posits that the cost of building materials account for sixty to seventy percent of direct cost of a project or facility.

Materials management is a process that co-ordinates planning, assessing the requirement, sourcing, purchasing, transportation, storing and controlling of materials, minimizing the wastages and optimizing the profitability by reducing cost of materials (Chetna 2011). Based on previous studies similar definitions of materials management have been obtained from the works of Dey (2001); Chandler (1978); Frank and Ronald (2005). Other authors have studied and discussed specific components contained in the definition of materials management. However, project planning needs an appropriate materials planning to be done concurrently with engineers and other project team. Also material planning would provide guide to all subsequent activities and this could have great impact on the project plan (Chiktara 2005).

Ahuja and Dozzi (1994) state that requisition is an integral step in materials management which goes to show the team's material requirement before they can place the purchase order. Accordingly, request for quotation uses drawings and specifications to help the builder estimate, control, manage and direct the work. Procurement is a broad term which includes all the firms purchasing and related activities. Purchasing involves obtaining all materials, tools and supplies necessary for operation and maintenance of the organization's facilities; it includes the responsibility of obtaining the right quality at the right prices, from the right source and at the right time. Purchasing function is central to materials management. Purchasing has the responsibility and authority to commit projects for materials through an appropriate vendor (Obiegbo 1999).

ECI (1994) states that material delivery to site is a critical productivity- related aspect which demands the introduction of a carefully-developed system of monitoring and control as early as possible. Furthermore, Inyang-Udoh (2002) observes that non-compliance strictly with construction programme in material stock control practice is another contributory factor which tends gradually to decrease productivity and profitability of projects and often leads to extension of time. Inyang-Udoh (2002) stress that store officers are very important in achieving a well-developed stock control process since they generate most of the necessary information about stock in their custody.

According to Inyang-Udoh (2002) suitable stock control yard is of paramount importance and the type of security personnel employed. The primary objectives of materials stock control as a function of materials management system is to ensure that optimum stock of materials is maintained at a level consistent with the level of activity of an organization (Iwegbue 1998). Nevertheless, many authors have discussed site materials control and materials waste in details (Wyatt, 1978; Site Management Practice Committee, 1980; and Johnston, 1981).

Ahuja and Dozzi (1994) state that movement of equipment, materials and personnel to the job site represents a unique and specialised element of materials management. Experienced traffic control personnel can have a positive impact on the execution of the project while minimizing transportation cost (Bamisile 2004). Koskela and Howell (2002) observe that the management is obsolete and there exists no underlying theory of project explicitly stated theory on project management. Their objection is that planning, execution and control are not utilized in practice as suggested by project management institute incorporated (2004).

2.0 Aim and Objectives

The aim of this study was to identify the key areas where material management is deficient so that improvement could be made to increase building productivity. In this regard, the specific objectives of the study include:

- To provide a better understanding of the concept of materials management and its related constructs;
- To identify the factors responsible for poor materials management in the building delivery process; and
- Recommend measures that can be adopted for effective materials management and increased building productivity in the study area.

3.0 Methodology

This study was carried out sequel to the responses from site engineers, managers and supervisors on focus interviews regarding materials management on ten organized building sites in the South Eastern States of Nigeria. Fourteen variables related to factors that hinder productivity as a result of poor materials management were derived from the interviews earlier conducted. These formed the background of the questionnaires that were divided into six groups, namely: material schedule; material scheduling; material control; material handling; material storage; and material wastages as shown in Table 1.

The study also relied on the review of related literature to address the problems identified in the study.

Table 1: Group Factors Responsible for Poor Materials Management

S/N	Factors	Rank Score				
		1 = Very little effect	2 = Little effect	3 = Fairly	4 = severe effect	5 = Very severe effect
	Material Schedule					
1.	Lack of establishment of total approximate quantities of materials before orders are made.					
2.	Lack of Consideration in detail the period over which deliveries can be spread without					

	affecting the contract.						
3.	Delay in receiving materials on sites.						
	Material Scheduling						
4.	Lack of consideration of making deliveries of materials at scheduled dates and times.						
5.	Lack of keeping adequate buffer stock in case of delay in receiving materials.						
6.	Non consideration of stacking materials at various points where work is going on.						
	Material Control						
7.	Lack of planning of sites to indicate main storage area and stockpiles.						
8.	Lack of co-ordination of movement of plant handling materials.						
	Material handling						
9.	Lack of proper designs (which do not allow for effective handling and fixing of materials).						
10.	Double handling of materials (increase costs and reduce productivity).						
	Material storage						
11.	Inadequate protection of materials (which can cause problems of workmanship and general finish).						
12.	Lack of procedures for checking, inspecting and documentation of materials.						
13.	Lack of co-ordinated system of withdrawing materials from the stores.						
	Material wastages						
14.	Poor control of material wastage on sites.						

A total of ninety questionnaires were launched to ten building sites; two sites from each state. Each respondent was asked to rate the identified factors that are responsible for poor materials management on a likert scale 1 to 5. Where 1 = very little effect; 2 = little effect; 3 = fairly; 4 = severe effect; and 5 = very severe effect. Finally eighty seven questionnaires were properly completed and returned as shown in Table 2. In order to rank the severity of the factors, a Mean Score index was employed.

Table 2: Response on Factors Responsible for Poor Materials Management

S/N	Factors	Rank Score					Total	Mean Score	Mean Rank
		VLE	LE	F	SE	VSE			
		1	2	3	4	5			
1.	Lack of establishment of total approximate quantities of materials before orders are made	12	9	18	26	22	87	3.54	1
2.	Lack of consideration in detail the								

	period over which deliveries can be spread without affecting the contact.	9	11	20	18	29	87	3.54	1
3.	Delay in receiving materials on sites.	13	12	14	16	32	87	3.48	3
4.	Poor control of materials wastages on sites.	12	9	18	24	24	87	3.45	4
5.	Lack of consideration of making deliveries of materials at scheduled dates and times.	10	14	18	21	24	87	3.40	5
6.	Lack of keeping adequate buffer stock in case of delay in receiving materials.	16	13	15	18	25	87	3.26	6
7.	Non consideration of stacking materials at various points where work is going on.	15	16	21	19	16	87	3.06	7
8.	Inadquate protection of materials (which can cause problems of workmanship and general finish).	17	16	21	14	19	87	3.02	8
9	Lack of planning of sites to indicate main storage area and stockpiles.	18	16	16	19	18	87	3.03	9
10	Lack of procedures for checking, inspecting and documentation of materials.	18	17	15	20	17	87	3.01	10
11	Lack of co-ordination of movement of plant handling materials	18	20	16	16	17	87	2.93	11
12	Lack of co-ordinated system of withdrawing materials from the stores	20	18	17	15	17	87	2.90	12
13	Double handling of materials (which can cause problems of workmanship and finish)	20	17	19	16	15	87	2.87	13
14	Lack of proper designs (which do not allow effective handling and fixing of materials).	23	18	15	15	16	87	2.80	14

- 1 Very little effect
- 2 Little effect
- 3 Fairly
- 4 Severe effect
- 5 Very severe effect

4.0 Results

From Table 2, the group of factors for highest poor management of materials is lack of provision of materials schedule; materials scheduling; delay in receiving materials on site; and poor control of material wastages. It is the estimator who initially produces schedules for the buyer. The estimator also produces figures for the materials to be delivered in bulk, which are ordered by the buyer leaving the rate of “call off” to be decided by site management. From the study, preparation of material schedule is given low priority to or is regarded as a meaningless chore given to those with little detailed construction knowledge or site experience to prepare.

Consequently, the presentation and clarity of the schedule does not always receive the attention it warrants or used sufficiently as a material control document. It could be that materials are ordered whenever site management feels like doing so. It is probably one of the most important documents associated with the construction programme; certainly for materials management control purposes. For material waste or losses, the following seem to be the most representative and most related on building sites:

- Superfluous materials that are no longer serving a purpose;
- Left over materials after use;
- Materials damaged through poor storage careless handling, and poor workmanship;
- Materials missing or deposited in areas which render them unsuitable;
- Materials damaged but useable within the contract for less important purposes; and
- Extravagant use of materials

The above are usual types of waste commonly observed on building sites which of course, would not be different from the sites under study. Waste occur on site for a number of reasons, most of which can be prevented to enhance productivity. Some of the more obvious ones are:

- Misinterpretation of drawings;
- Overestimating the quantity required;
- Faulty workmanship;
- Careless handling of materials; and
- Design requirements such as excessive cutting of components to achieve non-standard solutions.

The other problem associated with materials management on the sites under study is material scheduling. Generally there is lack of consideration of making deliveries of materials at scheduled times and dates. That goes to confirm that where there is no proper material schedule, scheduling becomes difficult if not impossible. Ideally before confirming any orders with suppliers, site management should establish the total quantities required and consider in detail the period (dates and time) over which deliveries can be spread without adversely affecting the contract. No provision of material schedules has adverse chain effects on material scheduling, delay in delivery of materials, material control and material handling.

5.0 Conclusion and Recommendations

This study has shown the problem areas in materials management which need to be addressed. Notable among them are non preparation of material schedules; material scheduling; and improper control of material wastages. Since the problem areas have been identified, measures should be taken by contracting organizations to upgrade their performance. This could be achieved by engaging full time estimators or Quantity Surveyors and material controllers. The estimators would provide figures on the materials to be delivered in bulk.

In preparing schedules, the building sequence could be broken down into operational groups or stages such as:

- Substructures;
- Superstructure;
- Finishes;
- Painting and decorating;
- Plumbing and electrical installations; and
- External works.

These groups can further be subdivided into elements or sections of the work which can be presented in terms of detailed quantities of materials. Material schedules/scheduling are useful to site management not only in showing the quantities involved in each particular operation, but also provide a key to the distribution of materials to suitable stockpiles as quantities arrive on site.

A well-controlled site demonstrates greater efficiency in off-loading materials; protection of materials on site; fewer temporary stockpiles; early recovery of surplus materials; and a reduction in double handling and waste. The value of materials stored on sites together with the controls needed for distributing materials; availability of adequate supplies; as well as ensuring that correct materials are supplied in the first place suggest that the only way to solve the problem satisfactorily is by delegating responsibilities to material controllers (Builders or Quantity Surveyors).

The forgoing suggestions would avert such problems as:

- Inadequate materials on site generally;
- Delay in receiving materials on site;
- Inadequate stockpile of materials at work locations;
- Unproductive times;
- Material wastages;
- Extension of contract period; and
- Minimization of profit.

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