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[Dicksonoluchi87@gmail.com](mailto:Dicksonoluchi87@gmail.com)

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Department of Integrated Science  
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Rumuolumeni,  
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## LIST OF CONTRIBUTORS

**Kingsley- Opara, Ngozi**

Research Scholar, Department of Computer Science, Ignatius Ajuru University of Education, rivers State, Nigeria.

**Prof. Asagba, Prince Oghenekaro.**

Visiting Scholar, Department of Computer Science, University of Education (IAUE), Rumolumeni, Port Harcourt, Rivers State Nigeria.  
Email: [asagbapince@uniport.edu.ng](mailto:asagbapince@uniport.edu.ng)

**Gabriel.B.C., Gabriel M.N.O.Asagba**

School of Graduate Studies Ignatius AJURU University of Education ((IAUE), Rumolumeni, Port Harcourt, Rivers State Nigeria.  
Department of Computer Science  
[Gabrielbariyira@gmail.com](mailto:Gabrielbariyira@gmail.com), [meegabzgmail.com](mailto:meegabzgmail.com)

**WAIDOR, Tamaramiebi Keith & ASAGBA, Prince Oghenekaro**

Department of Computer Science  
Faculty of Natural and Applied Sciences  
Ignatius Ajuru University of Education, Port Harcourt  
[Zalimaxxx@gmail.com](mailto:Zalimaxxx@gmail.com)

Department of Computer Sciences,  
University of Port Harcourt, Rivers State Nigeria.  
[Prince.asagba@uniport.edu.ng](mailto:Prince.asagba@uniport.edu.ng)

**Fibersima, Alalibo Ralph**

Visiting Scholar, Department of Computer Science,  
University of Port Harcourt, Rivers State Nigeria.  
[Fiberesima.a.r@outlook.com](mailto:Fiberesima.a.r@outlook.com)

**Asagba, Prince Oghenekaro.**

Visiting Scholar, Department of Computer Science,  
University of Port Harcourt, Rivers State Nigeria.  
[Asagba.prince@uniport.edu.ng](mailto:Asagba.prince@uniport.edu.ng)

**Kingsley- Opara, Ngozi**

Research Scholar, Department of Computer Science,  
Ignatius Ajuru University of Education, Rivers State Nigeria.  
Email: [ngoziopara@gmail.com](mailto:ngoziopara@gmail.com)

**Prof Asagba, Prince Oghenekaro.**

Visiting Scholar, Department of Computer Science,  
University of Port Harcourt, Rivers State Nigeria.

## EXAMINATION OF EFFECTIVE MATERIAL MANAGEMENT IN BUILDING WORKS FOR ENVIRONMENTAL DEVELOPMENT FOR NATIONAL ECONOMY

**AZUKWU SHEDRACK AMAECHI**

(Building Technology Option) &  
Department of Vocational Technology Education

E-Mail: [Azukwu.Shedrack@Yahoo.Com](mailto:Azukwu.Shedrack@Yahoo.Com)

Tel: 08149587984

&

**PROF. P. C. OKWELLE**

(Building Technology Option) &  
Department of Vocational Technology Education

[Pcokwelle@Gmail.Com](mailto:Pcokwelle@Gmail.Com)

Tel: 08023311193

### Abstract

*The problem associated with the materials management is one of the main issues/acing the building and construction industry in Nigeria. The activities identified ranging from ordering of materials to supply and materials usage we considered key to materials management because they basically affect the economy, effectiveness of material movement, productivity optimization of profit and reduction of materials cost thereby contributing to the economy of the country. Result shows that factor eight (8) with a mean score of 3.25 and mean ranking of which falls under material control is mostly responsible for ineffective materials management and lack of consideration in detailing the period over which deliveries can he spread without affecting the contract which falls under material storage has the least mean ranking.*

**Keywords:** materials management materials control, materials schedule, materials storage.

### INTRODUCTION

The effective construction materials management process is the secret to success of any construction project. Materials management can be viewed as a management system that is needed in proper planning and controlling of quality and quantity of the material, timely equipment placement, good price and the correct quantity as needed.

In the other hand, material management is a management system that combines purchasing, shipping and material control from suppliers. Based on this definition, generally speaking, material can be defined as a process of planning, executing and controlling the correct source of materials with the specified quality, at the right time and location suitable for minimum cost construction process.

The ability to efficiently coordinate and integrate purchasing, shipping and material control from suppliers is needed for cost control and regulation.



There are three important areas that hold the secret to a successful material management, and they include, materials purchasing, materials usage and material storage. It is a tool to cost reduction, which enhances profit-making and directs the production.

The Nigerian building and construction industry continues to occupy an important position in the nation's economy even though it contributes less than the manufacturing or other service industries (Albinu and Jagboro, 2002).

Then contribution of the building and construction industry to national economic growth calls for improved efficiency in the industry by means of cost effectiveness and timeliness and would in no little measure contribute to cost saving for the country at large. It is also known that the implementation of the construction project in the industry is usually accompanied with poor quality delivery time delay and cost increase as well as owner dissatisfaction (Hafez, 2001). Thus, the efficient use and management of material have an important influence on a company's profit and can delay project construction (Abdul Rabman and Alidrisyi, 1993). In this research I will examine the effects (impacts) of material management on project delivery in Nigeria.

Waste of construction materials on site refers to the difference between materials delivered to construction sites and those that are actually used for the construction work (Onabule, 1991). It can be deduced from Onabule's point that construction wastes are those materials supplied to site for construction and are not being used in the actual construction constituents. Therefore, there is a need for efficient materials management in order to control productivity and cost in construction projects.

### **1.1 OBJECTIVES OF THE STUDY**

- To examine the impact of materials management in Nigeria economy
- To examine the effects of material management on project delivery time in Nigeria
- To examine the causes of material wastage in the construction industry
- To examine the economy, benefit of effective material management strategy in the construction industry.

### **1.2 LIMITATION OF THE STUDY**

This research work is limited to building/construction works only as regards impact of effective materials management practical by some construction industries in Nigeria.

## **2.0 LITERATURE REWIEW**

Construction materials constitute a major cost component in any construction project. The total cost of installed materials (or value of materials) may be 50% or more of the total cost (Stukhart 1995, Benold and Tresler 1991). The efficient procurement and handling of materials represent a key role in success of the work. It is important for the contractor to consider that there may be significant difference in the date that the material was requested or date when the purchase order was made, and the time at which the material will be delivered.

The need for an effective material planning system becomes mandatory. Some companies have increased the efficiency of their activities in order to remain competitive and secure future work. Many other forms have reduced overheads and undertaken productivity improvement strategies. Considerable improvement and cost savings would seem possible through enhanced material management. Better materials management practices could increase efficiency in operations and reduce overall cost. There is a growing awareness in the construction industry that material management needs to be addressed as a comprehensive integrated management activity.

The typical tasks associated with a material management system according to (Tersine and Campbell (1977), Ammer (1980), Stukhart (1995) are:

- Procurement and purchasing
- Expediting
- Materials planning
- Materials handling
- Distribution
- Cost control
- Inventory management/Receiving/Warehousing
- Transportation

## 2.1 CLASSIFICATION OF MATERIALS

Stukhart (1995) states that the main categories of materials encountered in a construction project are engineered materials and fabricated materials.

- **Bulk materials:** Bulk materials- these are materials manufactured to standards and are purchased in quantity. They are bought in standard length or lot quantities. Examples of such materials include pipes, wiring, and ethics. They are more difficult to plan because of uncertainty in quantities needed.
- **Engineered materials-** these materials are specifically fabricated for a particular project or are manufactured to an industry specification in a shop away from the site. These materials are used for a particular purpose. This includes materials that require detailed engineering data.
- **Fabricated materials-** these are materials that are assembled together to form a finished part or a more complicated part. Examples of such materials include steel beams with holes and beam seats.

## 2.2 EFFECTS OF MATERIAL MANAGEMENT

- 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.

- Based on the studies presented, it is clear that effective management of materials can minimize the impact that lack of materials or improper management of materials could have on the overall schedule and cost of the project.

### 2.3 BENEFITS OF MATERIAL MANAGEMENT

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 (Bernold and Treseler, 1991). 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 and good relationship with suppliers
- Reduce storage of materials on site
- Labor savings and stock reduction
- Purchase savings and better cash flow management

### 2.4 CHALLENGES OF MATERIALS MANAGEMENT

The following are some of the challenges encountered in materials management;

- Process of purchasing and supply of materials, the challenges often occurs when the materials are not equivalent as the ordering purchase, the skipped list out ordering materials, timing of materials arriving, quantities of materials, lack of training and adequate management, lack of communication and relation between contractor and supply chain arc the main impediments.
- The executive and monetary process of payment
- The specification and measurement of the materials in construction site the challenges are obvious which are specifically as:
- The quantity ordered more than the needed quantity
- Mistaken time delivery which interrupts the work schedule
- Wrong material or fault in track of materials which will eventually lead to double work

### 3.0 METHODOLOGY

The data for the research was obtained through a well structured questionnaire designed to assess the views of respondents on material management on building construction sites. Respondents were asked to rate their perception regarding the level of importance of these strategies on a four (4) point likert ordinal scale where 4=totally agree, 3=agree, 2=disagree, and 1—totally disagree.

The study was carried out in Port Harcourt, Rivets state capital. The questionnaires were given to contractors in their main offices and their representatives on construction sites. A total of

forty (40) questionnaires were being distributed. Likert (1998), however believes that the minimum sample size that allows normal distribution assumptions to be used rather than using at-distribution is 30. Hence, the Sample size of 40 is inline.

Data obtained from the survey were analyzed using mean score index to rank the severity of the factors using the formula;

$$X = \sum (W \times R) / N$$

Where, W=the weight assigned to each strategy by the respondents,

R = number of respondents,

N = total number of the respondents. Eleven variables related to factors that hinder productivity as a result of poor material management were obtained from the interviews conducted. This form is the background of the questionnaires that divided into 5 groups, namely; material schedule, material scheduling, material control, material handling and material storage.

The study also made use of related literature to address the problems identified in the study.

S/N	FACTORS	RANK SCORE			
		1 = TOTALLY AGREE	2 = DISAGREE	3 = AGREE	4 = TOTALLY AGREE
	<b>Material Schedule</b>				
1.	Lack of establishment of total approximate quantities of materials before orders are made				
2.	Lack of consideration in detailing the period over which deliveries can be spread without affecting the contract.				
3.	Delay in receiving materials on sites				
	<b>Material Scheduling</b>				
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 storage				
9.	Inadequate protection of materials (which can cause problems of workmanship and general finish)				
10.	Lack of procedures for checking, inspecting and documentation of materials.				
11.	Lack of coordinated system of withdrawing materials from the stores.				

Finally, forty questionnaires were properly completed and returned as shown in table 2. In order rank the severity of the factors, a mean score was employed.

**Table 2: Response on factors responsible for poor material management.**

S/N	FACTORS	RANK SCORE						
		1 = TOTALLY DISAGREE	2 = TOTALLY DISAGREE	3 = AGREE	4 = TOTALLY AGREE	TOTAL	MEAN SCORE	MEAN BANKING
	<b>Material Schedule</b>							
1.	Lack of establishment of total approximate quantities of materials before orders are made.	5	8	12	15	40		
2.	Lack of consideration in detailing the period over which deliveries can be spread without	6	7	13	14	40		

	affecting the contract.							
3.	Delay in receiving materials on sites.	4	6	12	18	40		
	Material scheduling							
4.	Lack of keeping adequate buffer stock in case of delay in receiving materials.	2	8	13	17	40		
5.	Lack of keeping adequate buffer stock in case of delay in receiving materials.	3	7	10	20	40		
6.	Non consideration of stacking materials at various points where work is going on.	1	9	12	18	40		
	Material Control							
7.	Lack of planning of sites to indicate main storage area and stockpiles.	4	7	10	19	40		
8.	Lack of co-ordination of movement of plant handling materials.	2	6	12	20	40		
	Materials storage							
9.	Inadequate protection of materials (which can cause problems of workmanship)	3	6	11	20	40		

	and general finish).							
10.	Lack of procedures for checking, inspecting and documentation of materials.	5	5	11	19	40		
11.	Lack of coordinated system of withdrawing materials from the stores	2	8	12	18	40		

#### 4.0 RESULTS AND ANALYSIS

Table 3: The mean ranking of the factors;

S/N	FACTORS	RANK SCORE						
		1 = TOTALLY DISAGREE	2 = TOTALLY DISAGREE	3 = AGREE	4 = TOTALLY AGREE	TOTAL	MEAN SCORE	MEAN BANKING
1.	Lack of co-ordination of movement of plant handling materials.	2	6	12	20	40	3.25	1
2.	Inadequate protection of materials (which can cause problems of workmanship and general finish).	3	6	11	20	40	3.20	2
3.	Lack of keeping adequate buffer stock in case of delay in receiving materials	3	7	10	20	40	3.18	3
4.	Non consideration of stacking materials at various points where work is going on.	1	9	12	18	40	3.18	3
5.	Lack of coordinated system of withdrawing materials at	2	8	12	18	40	3.15	5

	scheduled dates and times.							
6.	Lack of consideration of making deliveries of materials at scheduled dates and times.	2	8	13	17	40	3.13	6
7.	Delay in receiving materials on sites.	4	6	12	18	40	3.10	7
8.	Lack of planning of sites to indicate main storage area and stockpiles.	4	7	10	19	40	3.10	7
9.	Lack of procedures for checking, inspecting and documentation of materials	5	5	11	19	40	3.10	7

Table 3 above shows the responses to the factors affecting materials management in building/construction sites and the mean ranking. Result shows that factor eight(8) with a mean score of 3.25 and mean ranking of 1 which falls under material control is mostly responsible for ineffective materials management and Lack of Consideration in detailing the period over which deliveries can be spread without affecting the contract which falls under material storage has the least mean ranking.

## 5.0 CONCLUSION AND RECOMMENDATION

This study has reviewed the problem areas in materials management which need to be addressed. The most significant among them are non-preparation of material schedule and material scheduling. Now that the problem areas have been identified, measures should be taken by contracting organizations P upgrade their performance. This could be achieved by engaging full time estimators or quantity surveyor and material controllers. The estimators would provide figures on materials to be delivered in bulk. These will go a long way to reduce cost thereby contributing to the profit of the contractor.

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

- Substructures
- Superstructures
- Finishes
- Painting and decoration
- Plumbing and electrical installation
- External work



Other construction works can also be divided into stages for easy planning and supply of materials to avoid wastages or stockpiling the site with materials, which may lead to wastage or theft as the case may be.

The value of materials stored on sites together with the controls needed for distributing material availability of adequate supplies; as well as ensuring that correct materials are supplied in the first ph suggests that the only way to solve the problem satisfactorily is by assigning responsibilities to material controllers (builders or quantity surveyors).

The above suggestion if put in place, will help solve such problem as; Inadequate stockpile of materials at work locations.

- Time wastages
- Material wastages
- Delay in supply of materials on site
- Inadequate materials on site, and
- Contract period extension.

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