IMPACT OF MATERIALS MANAGEMENT PRACTICES IN THE NIGERIAN BUILDING CONSTRUCTION INDUSTRY

BY

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ABSTRACT

Construction materials are a major cost component in any construction project**.** A factor that affects the performance of construction projects to a large extent is the poor management of materials during site activities. The research centered on impact of materials management practices in the Nigerian construction industry. This study assessed the impact of materials management with emphasis on building projects. Data were collected with the aid of questionnaires administered to professionals in construction sites. The data generated were analysed using descriptive statistics. The research findings indicate that the main impacts of effective materials management practices are reduced cost of materials, good quality control, better field material control, better handling of materials, adequate storage of materials on site, improvements in productivity and completion of project on time. Based on the findings, it was concluded effective materials management practices improve the overall handling of materials for more efficiency and effectiveness on the construction site. The paper recommends that there should be proper planning of material management practices right from the inception of project execution and should also be practiced on all sites and by all categories of construction industry, whether large, medium or small so as to ensure timely project execution and standard work delivery within reasonable cost, time and quality.

Keywords: impact, logistic, planning, practices, and procurement

1.0 INTRODUCTION

Materials management practice is a procedure that coordinates planning, assessing the requirement, sourcing, purchasing, transporting, storing and controlling of materials, minimizing the wastage and optimising the profitability by reducing cost of material (Phu & Cho, 2014). Management of construction material is a new practice in the construction industry (Harris & McCaffer, 2013). In the present situation, the management and the designers are mainly concerned on how to control cost without any emphasis on material management measures (Wahab & Lawal, 2011). On the whole, it is accepted that cost of materials accounts for a great percentage of the

total cost of construction projects (Kerzner, 2013). Therefore, a critical management of materials on site should be adopted. According to Adafin, Daramola & Ayodele (2010) construction material management is of central importance to the economic development of the construction industry. Ajayi *et al* (2017) define construction material management as a reduction in the amount and environmental effect of material waste generated, by reducing the amount of materials consumed in a project. Muleya & Kamalondo (2017) also identify material management as an integrated process of designing, constructing new structures or re-modelling existing structures, using materials more efficiently with a great importance of contributing to construction industry's performance improvement as well as solving material waste management problems. Several authors from different parts of the world have shown that material waste from the construction firm represents a relatively large percentage of the production costs (Saidu & Shakantu, 2016). The poor management of materials leads to an increase in the total cost of building projects (Ameh & Itodo, 2013).

However, there is no project that can start without an adequate supply of materials, apart from the careful planning of materials required by the builder: it has the advantage to foster a good relationship with the suppliers, many of whom would have been selected due to their fulfilment of orders to the standard required and meeting of delivery times over a number of years (Adeyinka *et al,* 2014). According to Patel & Vyas (2011) building materials account for 60 to 70 percent of direct cost of a project, while the remaining 30 to 40 percent being the labour cost. Therefore, efficient procurement and handling of materials represent a key role in the successful completion of the work. The management of materials on construction project to reduce, reuse, and recycle has a serious bearing on the cost, quality, time and impact of the project on the environment (Dania, Kehinde & Bala, 2007). More so, Adewuyi (2012) notes that there is a significant relationship between the level of materials waste on site and the cost overrun of a project. The cost of material waste which exists on sites represents unnecessary cost in construction which can either be eliminated or reduced (Bekr, 2014).

2.0 Impacts of Materials Management on Construction Projects

Effective practice of materials management plays a key role in the successful completion of a project. The impact of effective materials management practices on construction projects includes:

1. Environmental impact: This includes the conservation of natural resources, reduction of energy consumption, conservation of landfill space and reduction of environmental impacts across the life cycle by decreasing the demand for virgin products (Van Ewijk, & Stegemann, 2016).

2. Economic impact: It includes reduction in disposal costs and may reduce transportation of material costs which leads to reducing overall project costs, reduction in purchasing costs since non-virgin materials are often less expensive than virgin resources, make contractors to be more competitive with their bids at reduced costs and it creates employment opportunities and economic activities in the reuse and recycling industries (Beamon, 2008).

3. Performance impact: This includes reclamation of salvaged or reused materials which can perform as well as or better than virgin products in many applications, reduction in 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 labour productivity, improvements in project schedule, quality control, better field material control, better relations with suppliers, reduction in materials surplus, reduced storage of materials on site, labour savings, stock reduction, purchase savings and better cash flow management (Jensen, 2014).

Other impacts of materials management practices that could benefit construction industry includes: reduce cost of materials, improvements in productivity, project will be constructed on time or than expected, purchase saving, providing adequate storage of material on site, improvements in project schedule, effective design site layout so as to aid in the management of materials on site, installation of materials hoists on site to aid in the movement of materials, good relations with suppliers, effective handling of materials, control of materials on site, quality work, reduced materials wastage and better cash flow management (Albert, 2014).

2.1 Materials Management Practices

Materials management practices involve the planning, procurement, handling, stock and waste control, and logistics surrounding materials on construction projects. A good materials management environment enables proper materials handling on construction sites. In order to

better understand materials management, the following processes are discussed: planning, procurement, logistics, handling, stock and waste control.

1. Planning: The materials planning process covers setting up and maintaining the records of each part used in each plant to determine target inventory levels, and delivery frequency (Tanko, Abdullah & Ramly, 2017). Effective management of the materials record will help the flow of materials at the site in order to avoid several problems such as materials out of stock and materials that have not been delivered. It also provides guides to all the subsequent activities and this could have a great impact on the project plan.

2. Procurement: The objective of procurement in materials management is to provide quality materials at the right time and place, and at an agreed budget. Adeyinka *et al* (2014) states that procurement is about organizing the purchasing of materials and issuing delivery schedules to suppliers and following-up, to make sure that suppliers deliver on time.

3. **Handling:** Handling of materials is the flow component that provides for their movement and placement. The importance of appropriate handling of materials is highlighted by the fact that they are expensive and engage critical decisions. Due to the frequency of handling materials there are quality considerations when designing a materials handling system. It is important to know the type of material handle system since it enhances the production process, provides effective utilisation of manpower, increases production and improves system flexibility (Dania, Kehinde, & Bala, 2007).

4. **Stock and waste control**: Stock control ensure all items such as raw materials, processed materials, and components for assembly, consumables stores, general stores, maintenance materials and spares work in progress and finished products are available when required (Harris & Coffer, 2013). Waste can be reduced through the careful consideration of the need for minimisation and better reuse of materials in both the design and construction phases. Given these facts, there is need for materials storage on site to avoid wastes, loss and damage of materials which affect the operations on the construction project.

5. Logistics: This is a concept that emphasizes movement and it encompasses planning, implementing, and controlling the flow and storage of all goods from raw materials to the finished product to meet customer requirements (Ogunde *et al.,* 2017). Raw materials for construction are usually varied, bulky and heavy and required proper handling in the supplying process. The primary focus of the logistics in any construction projects is to improve coordination and

communication between project participations during the design and construction phases, particularly in the materials flow control process (Fleischman *et al.*, 2014).

3.0 RESEARCH METHOD

The methods used for this study include extensive searching of relevant literatures relating to the study such as textbooks, magazines, journals, and the internet. Primary data were collected in Lagos, Abuja and Kaduna. The sample frame for this study consisted of architects, builders, civil engineers, quantity surveyors and others. A structured questionnaire was administered to the sample frame, after selecting them by means of a simple random sampling technique. A sample size of 90 was chosen for this study from which 30 questionnaires were administered to each of the two states and Abuja. After preliminary analysis of the data the number of usable questionnaires for analysis amounted to: 19 from Lagos; 21 from Abuja; and 16 from Kaduna. On the whole, a total of 56 questionnaires were returned completed in a usable format. A return rate of 62% was achieved which was considered sufficient for the study. Data analyses were undertaken using descriptive statistics. Frequency means, and percentages were used to express the statistical result. This was achieved using Microsoft excel and statistical package for the social science (SPSS).

4.0 RESULT AND DISCUSSION

This section presents the results for the study.

Table 1 Person in Charge of managing materials in construction project

Responses	***Frequency***	***Percentage %***
General Manager	9	16.1
Project Manager	13	23.2
Site Manager	8	14.3
Store Manager	23	41.1
Others	3	5.4
Total	56	100.0

Table 1 Shows that the person in-charge-of managing material is the store manager 41.1%, followed by project manager 23.2%, and then General Manager 16.1% while site engineer 14.1% and others 5.4%.

Table 2 Person responsible for ordering materials

Responses	*Frequency*	*Percentage %*
General manager	4	7.1
Site engineer	6	10.7
Procurement dept.	36	64.3
project manager	9	16.1
Others	1	1.8
Total	56	100.0

Table 2 shows that 64.3% of the respondents for procurement department responsible for ordering materials, 16.1% of the project manager responsible for this duty, 10.7% for site engineer while 7.1% of the General Manager for ordering of materials and 1.8% for others.

Table 3 method for purchasing of material

Responses	*Frequency*	*Percentage %*
Bulk purchase	43	76.8
in pieces	13	23.2
Total	56	100.0

It shows that majority of the respondents goes for bulk purchase whenever purchasing construction materials.

Table 4 Planning for Project

Responses	*Frequency*	*Percentage %*
Before tender	12	21.4
After award of contract	36	64.3
during construction process	8	14.3
Total	56	100.0

Table 4 shows how materials planner starts planning for project. From the table, 64.3% of the respondents agreed for after award of contract, 21.4% for before tender while 14.3% observed during construction process.

Table 5 Assessment of Materials

Responses	*Frequency*	*Percentage %*
Testing	9	16.1
Selection	31	55.4
Measurement	16	28.6
Total	56	100.0

From Table 5 above, the study shows that selection of materials was ranked as the highest for assessing materials in the Nigerian Building Construction Industry with 55.4% follow by measurement of materials with 28.6% while 16.1% agree for testing for materials.

Table 6 Impacts of materials management practices

S/n Impacts	*Mean*	*Std. Dev.*
1. Reduce cost of materials	4.785	.414
2. Improvements in labour productivity	4.517	.632
3. Project will be constructed on time or earlier than expected	4.303	.658
4. Purchase saving	4.553	.501
5. Providing adequate storage of material on site	4.482	.504
6. Reduction in duplicated orders	4.392	.528
7. Improvements in project schedule	4.535	.601
8. The effective design site layout so as to aid in the management of materials on site	4.607	.651
9. The installation of materials hoists on site to aid in the movement of materials	4.553	.630
10. Better relations with suppliers	4.500	.572
11. Better handling of materials	4.714	.455
12. Better field material control	4.678	.471
13. Quality control	4.571	.499
14. Reduce materials surplus	4.821	.386
15. Better cash flow management	4.446	.600

The result reveals most common ways through which impacts of materials management practices contribute to the success of construction project are reduced cost of materials, quality control, better field material control, better handling of materials, adequate storage of material on site, improvements in productivity, and completion of project on time. it was observed that the respondents strongly agree for impacts of materials management practices in the construction industry with mean value 4.0 and above.

5.0 CONCLUSION AND RECOMMENDATION

This research has examined the impacts of materials management practices in the Nigerian building construction industry. This paper describes the impacts of materials management as three categories; environmental impact, economics impact and performance impact. Based on the findings from this research, the following conclusions are drawn. The study shows the impact of materials management practices improves the overall in handling of materials for more efficiency and effectiveness on the construction site. This is because poor handling of construction materials affects the overall performance of construction projects in terms of cost, time, quality and productivity. Materials management practices improve the success rate of project planning and execution thus lowering the project cost. More so, the minimisation of materials wastage during the construction phases is important in order to avoid loss of profits.

There should be proper planning of material management practices right from the inception of project execution and should also be practiced on all sites and by all categories of construction industry, whether large, medium or small so as to ensure timely project execution and standard work delivery within reasonable cost, time and quality.

REFERENCES

Adafin, J. K., Daramola, O., & Ayodele, E. O. (2010). Study of Material Control Strategies in Some Selected Construction Firms in Nigeria". *Continental Journal of (online) Sustainable Development 1: 62-72, 2010< http://www. wiloludjournal.com.*

Adewuyi, T. O. (2012). *Construction Material Waste Planning and Control Techniques on*

Building Sites in South-South of Nigeria. (Unpublished Doctoral dissertation, PhD Thesis, Department of Building, Faculty of Environmental Studies, University of Uyo, Uyo, Nigeria).

Adeyinka, B. F., Jagboro, G. O., Ojo, G. K., & Odediran, S. J. (2014). An assessment of construction professionals' level of compliance to ethical standards in the Nigerian construction industry. *Journal of Construction Project Management and Innovation*, *4*(1). 863-881.

Ajayi, S. O., Oyedele, L. O., Akinade, O. O., Bilal, M., Alaka, H. A., & Owolabi, H. A. (2017). Optimising material procurement for construction waste minimization: An exploration of success factors. *Sustainable Materials and Technologies*, *11*, 38-46.

Albert, I., (2014). *Assessment of Professional's Perception on Materials Management Practices on Construction Sites in Selected States in Nigeria*. Zaria: Unpublished M.Sc Thesis at Ahmadu Bello University.

Ameh, J.O. & Itodo, E.D., (2013). Professionals' views of material wastage on construction sites. *Organization, Technology and Management in Construction. An International Journal,* 5(1): 747-757.

Beamon, B. M. (2008). Sustainability and the future of supply chain management. *Operations and Supply Chain Management*, *1*(1), 4-18.

Bekr, G.A., (2014). Study of the Causes and Magnitude of Wastage of Materials on Construction sites in Jordan. *Journal of Construction Engineering, 2014.* 1-6.

Dania, A. A., Kehinde, J. O., & Bala, K. (2007). A study of construction material waste management practices by construction firms in Nigeria. In *Proceedings of the 3rd Scottish Conference for Postgraduate Researchers of the Built and Natural Environment, Glasgow*. 121-129.

Fleischmann, A., Schmidt, W., Stary, C., Obermeier, S., & Brger, E. (2014). *Subject-oriented business process management*. Springer Publishing Company, Incorporated.

Harris, F., & McCaffer, R. (2013). *Modern construction management*. John Wiley & Sons.

Jensen, M. (2014). *Lean Waste Stream: Reducing Material Use and Garbage Using Lean Principles*. CRC Press.

Kerzner, H. (2013). *Project management: a systems approach to planning, scheduling, and controlling*. John Wiley & Sons.

Muleya, F., & Kamalondo, H. (2017). An Investigation of Waste Management Practices in the Zambian Construction Industry. *Journal of Building Construction and Planning Research*, *5*(01), 1-13.

Ogunde, A., Olaolu, O., Afolabi, A., Owolabi, J., & Ojelabi, R. (2017). Challenges Confronting Construction Project Management System for Sustainable Construction in Developing Countries: Professionals Perspectives (A Case Study of Nigeria). *Journal of Building Performance*, *8*(1), 1-11.

Patel, K. V., & Vyas, C. M. (2011, May). Construction materials management on project sites. In *National Conference on Recent Trends in Engineering & Technology*. 1-5.

Phu, N.L. and Cho, A.M., 2014. Factors Affecting Material Management in Building Construction Projects. *International journal of Scientific Engineering and Technological Research*, *3*(10). 2133-2137.

Saidu, I., & Shakantu, W. (2016). The contributions of construction material waste to project cost overruns in Abuja, Nigeria: review article. *Acta Structilia: Journal for the Physical and Development Sciences*, *23*(1). 99-113.

Tanko, B. L., Abdullah, F., & Ramly, Z. M. (2017). Stakeholders Assessment of Constraints to Project Delivery in the Nigerian Construction Industry. *International Journal of Built Environment and Sustainability*, *4*(1). 56-62.

Van Ewijk, S., & Stegemann, J. A. (2016). Limitations of the waste hierarchy for achieving absolute reductions in material throughput. *Journal of Cleaner Production*, *132*, 122-128.

Wahab, A. B., & Lawal, A. F. (2011). An evaluation of waste control measures in construction industry in Nigeria. *African Journal of Environmental Science and Technology*, *5*(3), 246-254.