



Assessment Of Materials Management Practices On Building Construction Sites In Owerri Metropolis, Imo State, Nigeria

Azodoh, Arinze Chibueze¹ & Dr. (Bldr.) Ezeokoli, Fidelis Okechukwu²

Department of Building
Faculty of Environmental Sciences
Nnamdi Azikwe University, Awka, Anambra State, Nigeria

¹Azodohchibueze2015@gmail.com

²okeyezeokoli@gmail.com

ABSTRACT

The study assessed the materials management practices on building construction sites in Owerri metropolis, Imo State. The research was based on a descriptive research design with the use of questionnaire. The instrument for data collection was a structured 19- item questionnaire titled “materials management practices on building construction sites (AMPBCSQ) Questionnaire. The instrument was validated by three experts in Building department. Cronbach Alpha reliability technique was used to determine the reliability of the instrument which yielded an overall reliability coefficient of 0.77. Data collected were analyzed by means of descriptive statistics and ANOVA was used to test the hypothesis. Findings revealed that building construction professionals agreed that first in first out (FIFO) method, are most planning/Scheduling/ordering management practices adopted in construction, for transport materials management practices, open deck vehicles, enclosed vans, are currently practiced on their site. Under methods used for storing materials on building projects, it shows that the respondents agreed that fenced, un-fenced, method are methods used for storing materials on building projects. Material handling management practices, the most frequently embraced among the material handling management parameters listed on building sites are manual and forklift truck on site. The study indicated that there is no significant difference between the mean ratings of building professionals (Architects, Builders, Civil Engineer and Quantity Surveyors) on current materials management practices. Based on the findings the study recommends that: The construction companies should make use of more than one material management technique on construction projects so as to achieve maximum project delivery success and Federal government should as a matter of urgency create or establish construction industry development commission which will be made up of the professionals in the industry to fashion the way forward for the future of the industry.

Keywords: Materials management practices, Building Construction

INTRODUCTION

Construction projects depend upon having the right people with right skills and equipment that are able to deliver the project on time and on budget. According to Ammer (2014), having the right materials, in the right place at the right time equally is important and having the cash flow and capital to procure the labour and materials is also important. research conducted by Donyavi and Flanagan, (2019) shows that materials on typical project represent anything from 30% to 70% of the cost of the work, yet materials management has not received a lot of attention. Labour, material, tools, equipment and cash are the main parts of any construction project.

Kasim (2017) defined material management as a process that coordinates planning, assessing the requirement, sourcing, purchasing, transporting, storing and controlling of materials, minimizing the wastage and optimizing the profitability by reducing cost of material. Baldua (1997) noted that Materials management is a process for planning, executing and controlling field and office activities in construction. While Eduardo (2002) viewed Materials management as 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.

The building construction industry is referred to as the organized economic activity involving the assembling of materials, labour, plants and equipment, financial resources and managing all these inputs towards achieving desired goals (Ojo, 2015). According to Khyomesh and Chetna, (2011) Building materials account for 60 to 70 percent of direct cost of a project or a facility, the remaining 30 to 40 percent being the labour cost. Therefore, efficient procurement and handling of material represent a key role in the successful completion of the work. It is important for the project manager 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. These delays can occur if the contractor needs a large quantity of material that the supplier is not able to produce at that time or by any other factors beyond his control. Chan (2012) noted that the project manager should always consider that procurement of materials is a potential cause for delay. The management of Construction processes to reduce, reuse, recycle and effectively dispose of wastes has a serious bearing on the final cost, quality, time and impact of the project on the environment. (Dania, 2017)

In his submission, Lan (2018), opined that the rate at which materials are been squandered on site due to poor management is getting too rampant in our society and if not curbed, it can jeopardize the future of our construction industry. This is particularly true in view of the fact that mismanagement of construction resources (i.e materials, plants and labour) affects the continuity and profit margin of such project and if not checked can lead to technical insolvency or bankruptcy. Therefore, attention must be paid to how materials are been procured, stored and managed in order to achieve perfect work, effective handling of materials, right usage of materials and control of construction resources. This, explain the reason why Johnson (2016), noted that Materials management begins with planning and estimation, these can be achieved through proper site co-ordination measure of reducing wastes, the location and security of materials on sites, procurement of quality materials as being specified and effective administration of site together with quality control.

Construction projects can be accomplished by utilizing management processes and these processes include planning, organizing, executing, monitoring, and controlling (Ahuja in Al Haddad 2016). During any construction project the three inter-related factors of time, cost, and quality need to be controlled and managed. Successful completion of projects requires all resources to be effectively managed. Prabu and Baker, (2016) regard Materials management as a means to achieve better productivity, which should be translated into cost reduction. For, according to Ademeso and Windapo (2018), 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.

Material flow is viewed as a system by material management. This is proved by the fact that materials management sees organization as a whole rather than series of elements. Thus materials management promotes the idea of effective collaboration between the various elements of a system towards the achievement of a stated organizational goal. To achieve this, the objective must be clearly defined, which within the construction of a building is usually aimed at the completion of the building on schedules at the lowest possible price, keeping the quality of the building to specified standard. The main thrust of materials management is to avoid sub optimization and to improve the system efficiency and effectiveness. For this to occur, according to Adeniyi (2000), proper planning and control of material

resources must be done. This will aid productivity and efficient use of labour and materials. However, it has been observed that despite all efforts to plan and control resources, a lot of factors militate against these efforts. These common problems particularly on building construction sites form the basis of investigation and the need for the research.

Statement of the Problem

A cursory look at materials management of construction materials in Owerri Metropolis reveals negligence of proper materials management practice. This is because most construction managers in Owerri Metropolis has failed to give little priorities to installing individuals or department that can oversee the proper management of materials. The absence of these individuals or department may lead to some negative consequences on construction sites such as, breakage of materials, double handling of materials, materials wastage, client dissatisfaction, reduction in the productivity of workers, project cost and time over run and delay in progress of work at the construction site. Similarly, from researchers' observation on construction sites in Owerri metropolis, Imo State, the researcher observed that most construction sites are known with emergency purchases of materials, inadequate storage, double handling of materials, material shortages, theft and sometimes condemnation of materials by workers. All these problems have associations with poor materials management practices used on project sites. Effective materials management techniques have not received a lot of attention on most project sites in the Owerri Imo State. The aforementioned challenges motivated the research.

Aim

The aim of this study is to assess the materials management practices on building construction sites in Owerri metropolis, Imo State; with a view to develop measures for effective material management on the construction sites.

Research Objectives

The Research Objectives include:

1. To establish the planning /Scheduling/ordering management practices on building construction sites in Owerri metropolis, Imo State
2. To determine the procurement/purchasing materials management practices on building construction sites in Owerri metropolis, Imo State
3. To ascertain the material transport management practices on building construction sites in Owerri metropolis, Imo State
4. To examine the material storage management practices on building construction sites in Owerri metropolis, Imo State
5. To determine material handling management practices on building construction sites in Owerri metropolis, Imo State

Research Questions

The research questions include:

1. What are the planning /Scheduling/ordering management practices on the sites on building construction sites in Owerri metropolis, Imo State?
2. What is the procurement/purchasing materials management practices on building construction sites in Owerri metropolis, Imo State?
3. What are the transport management practices on building construction sites in Owerri metropolis, Imo State
4. What are the material storage management practices on building construction sites in Owerri metropolis, Imo State
5. What are the material handling management practices on building construction sites in Owerri metropolis, Imo State

Research Hypothesis

One null hypothesis was formulated to guide the study and was tested at 0.05 level of significance.

HO₁: The current management practice does not significantly affect the construction performance on building construction sites in Owerri Metropolis.

Significance of the Study

This study will be of great benefit to building construction stakeholders in the construction industry such as professional builders, construction professional bodies, construction workers, construction management team, curriculum planners, and students in the department of building, and future researchers.

The findings of the study would help the construction industry to know the impact of materials management practices on the construction performance, to tackle material management issues that affect material management on the construction site. The findings would spur the construction management to make necessary moves to adopt adequate measure of material management to ensure project performance. This will help the Government in making policies to improve materials management's practices on construction sites.

To the construction professional bodies, the findings from the study will help construction professional bodies to develop policies and practices that could improve material management on building construction sites. The study will also provide construction experts efficient materials management practices to be adopted to ensure project success.

This study will be theoretically significant to building literature as it will contribute to the build-up of a compendium of information on building. The paucity of building will thus assuage this provision

Scope and Delimitation of the Study

This study concentrated on materials management practices on building construction sites in Owerri metropolis, Imo State Nigeria. The focus was on the current materials management practices, and impacts of materials management practices. The research work was delimited to some selected building construction sites in Owerri metropolis of Imo state.

2.0 Conceptual Review

2.1 Materials Management

Zenz (2013) defines materials management as a concept which brings together under one manager the responsibility for determining the manufacturing requirement, scheduling the manufacturing process and procuring, storing and dispensing materials. As that, it is concerned with the control activities involved in the acquisition and use of material employed in the production of the finished project. Finally, Ammer (2014) posit his chronological view of material management as a line of responsibility, which begins with the selection of suppliers and ends when the materials are delivered to their point of use. The above concept of material management have common objectives, the material organization which is most appropriate for one company may not be the best form for another company.

Materials management is an important function in order to improve productivity in construction projects. According to Bell and Stukhart (2016) materials management functions include "material requirement planning and material take ox vendor evaluation and selection, purchasing, expenditure, shipping, material receiving, warehousing and inventory, and material distribution". This is concerned with the planning and controlling process to ensure that the right quality and quantity of materials and installed equipment are appropriately specified in a timely manner, obtained at reasonable cost and are available when needed.

According to Kasim (2017) materials management involves the logistics of the materials components of a supply chain which involves the process of planning, implementing and controlling of the movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of consumption. The management of materials should be considered from the phases of the construction process and throughout the construction period. Generally, construction materials are bulky, expensive

and are supplied in large amounts to construction sites. Therefore, there is a need for an excellent management system for handling materials.

2.2 Material Management Practices on Construction Site

According to Idowu, Winston and Kabir (2019), materials management practices involve the planning, procurement, handling, stock and waste control, and logistics surrounding materials on construction projects. Idowu, *et al* (2019) also stated that a good materials management environment enables proper materials handling on construction sites. In order to better understand materials management practices, the following processes are discussed: planning, procurement, logistics, handling, stock and waste control.

1. Planning: Burt (2016) observed that planning and programming of work should include strategies, tactics, and tools for managing the design and construction delivery processes and for controlling key factor to ensure the client receives a facility that matches their expectations and function as it is intended to function. Khyomesh (2015), opined that materials requirement planning technique is used to determine the quantity and timing requirements of dependent demand “materials used in the construction operation”. The planning should be revised as frequently as possible in order to monitor whether work is progressing as planned. During the planning prices, detailing the project in terms of its outcome, team members’ roles and responsibilities, schedules, resources, scope and costs are needed. At the end of this phase, a project management plan is produced, which is a document that details how your project will be executed, monitored and controlled, and closed. Tanko, Abdullah and Ramly, (2017) noted that 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. This implies that effective planning 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. According to Idowu (2014), activities involved in planning materials material management practices on construction site are:

a) Schedule Activities: Paul (2017) said that construction scheduling is concerned with the regulation of the flow of construction units through their preconceived plans of operations, material. Material scheduling involve the establishment of time tables for the ordering of all materials requirement for maintaining the flow of materials must be schedule to coincide with the flow of all construction of activities involved in the actual construction of each project. Chandler (2018), said schedule is a list in a diagrammatic presentation indicating requirement of resources. And aid used in the ordering of material is schedule. Materials gratuity will be required to be taken off from the drawing and must show:-

- a. Quantity required to be fixed.
- b. Waste allowed in the estimate.
- c. The gratuity to be ordered.
- d. Date of delivery.
- e. Cost includes in the estimate.

The schedule is usually produced by quantity surveyor or by a material schedule. By systematic analysis to bills of quantity and contract drawing with specification, schedule is the pre-requisite for the programming of the materials delivery and material usage planning on the site. Material should never be ordered directly from the contract bills, which are only intended as a guide to the contractor pricing the contract. The estimate will produce schedule of material for the buyer. The estimator will produce figure for material to be delivered in bulk and those material that should be imported. The date of delivery guaranteed by the suppliers against each item can be compared with the builders plan requirements. In those circumstances changes in the specification with often enable the builder to order under material that will available within the required period for delivery and thereby avoid unnecessary delay in the future.

b) Ordering Activities: Materials may be ordered for by the architect or the contractor. The supplier dominated by the architect is called dominated supply. Whoever is making the order should give fullest information as regard delivery debt, the hour during which the material will be accepted on site and other general terms and conditions such as liability for damage use, method of packing, size and

weight of the load that can be handle on site. Materials that are on long term delivery should be placed on other as soon as the contract is sign so that material will arrive at the reward time. In the short form programmed the quantity of material required in the place and period of its use to be indicated.

c) Storage Activities: Before the material ordered arrives adequate preparation should be pounded for storage and its handing storage of nation and successful coordination are vital so as to prevent dissipation to site prevent dissipation to site procedures and wastage to material caused by disregard and disorganize operatives. Also good storage enhances proper management of materials aid it minimizes concerned. The rate at which materials are being used and the working order should provide a guide as to the quantity of materials to be ordered.

d) Transportation Activities: An efficient transportation of construction materials from storage to point of use reduces project cost. Therefore proper transportation planning system should be planned, the route and the best suited for the conveyance of each material should be used ford. And all fragile material must be tired to the transporting plan to prevent breakage. In the finer analysis, purchasing and trafficking have no logical alternative but walk together. Their interest are so interrelated that the performance of one department significantly influence use the degree of success attain by the order if purchasing ignore the principle of good traffic management in its daily work. It will in the long run inevitably pay excessive price for the transportation segment of the material it brings (Lamer, 2017).

e) Procurement Activities: Payne, Cliclsoin, and Rca vill, (2016) stated 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. According to Barrie and Paulson, (2012) see procurement encompasses a wide range of activities that includes purchasing of equipment, materials, labour and services required for construction and implementation of a project. The objective of procurement in materials management is to provide quality materials at the right time and place, and at an agreed budget. A failure in the purchasing process or in overseeing and organizing the buying functions as listed by Canter (2003) could result in:

- i. Over-ordering of materials (wastage problems);
- ii. Over-payments for materials (inadequate administration procedures);
- iii. Loss of benefits (lack of skilled negotiating procedures)
- iii. Lack of knowledge (when and where the best service/source might be available at any particular time).

f) Purchase Activities: According to Lamer (2017), purchasing is one of the basics functions common to all type of business enterprise. Purchasing has a direct impact on profitability and individual job profits. Purchasing needed raw material, supplies and equipment is a vital area for cost reduction. These functions are basic because no business can operate without them all business are administered or managed by coordinating and integrating those six functions:-

- i. Creation, the idea of design function
- ii. Finance, the capital acquisition records function
- iii. Personnel, the human resources and labour relation function
- iv. Purchasing, the buying of required equipment, material, and services
- v. Conversion, the changing of material to economic goods
- vi. Distribution, the selling or marketing of goods produced

The good of the purchasing department then should be to avoid cheap purchase but to look for optimum purchases. Sometime good material can be purchased at lower unit cost through large – order size purchases. Since it involve the spending of large sums. Frank (2010) explained circumstances of misuse and water of resources in the form of material can be extensive and include:

- a) buying the wrong article
- b) Buying too much
- c) Buying too little
- d) Buying uneconomically
- e) Losing material in transit, in storage in use

- f) Materials stolen or proffered
- g) Spoilage and damage to material before use
- h) Scrap and spoiling during use
- i) Buying or making out of balance

2. Material Handling: According to Tompkins and White (2014), effective material handling is when using the right method, amount, material, place, time, sequence, position, condition, and cost in production process. This involves handling, storing, and controlling of the construction materials. 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. Chan (2012) state that due to the frequency of handling materials there are quality considerations when designing a materials handling system. Material handling equipment selection is an important function as it can enhance the production process, provide effective utilization of manpower, increase production and improve system flexibility. Sadiwala (2017), affirmed the following improvement of materials handling system which are: Motion which implies that materials movement from one place to another should be handled efficiently to eliminate avoidable movements so as to minimize cost, Time which indicate that materials handling officer must ensure materials get to, or remove from production unit at the right time, Place that materials should be at the right place at the right time to enhance smooth operations, Quantity: which means that materials supply to, or remove from the right place should be according to operating unit demands and Space: which means efficient storage space is paramount to achieving the objectives of materials handling system and overall organization goals.

3. Material Procurement: Adeyinka (2014) observed that procurement is all about organizing the purchasing of materials and issuing delivery schedules to suppliers and following-up to make sure that suppliers deliver it on time. The term procurement encompasses a wide range of activities that includes purchasing of equipment, materials, labour and services required for construction and implementation of a project. The objective of procurement in materials management is to provide quality materials at the right time and place, and at an agreed budget. Procurement is also about organizing the purchasing of materials and issuing delivery schedules to suppliers and following-up, to make sure that suppliers deliver on time.

4. Transportation: According to Ahuja and Dozzi (2014), the movement of equipment, materials, and personnel to the job site represents a unique and specialization element of materials management. Good logistics involved the use of minimum of materials on site awaiting assembly, as well as being good for cash flow, this makes it easier to keep the site clean and tidy and reduces opportunities for slips trips and falls, an effective logistics team will also pay attention to the maintenance of plant and equipment. Transportation or traffic expertise aids the materials management team in handling numerous types of special loads from delicate electronics to massive modules. Knowledge of requirements, source and availability of this equipment may be critical to successful execution of the work, transport permitting requirements also must be considered early in the project (Bailey and Farmer, 2012).

5. Material waste control: According to Prabu and Baker (2016) stock control is classified as a technique devised to cover and ensure all items are available when required. Stock control can include raw materials, processed materials, and components for assembly, consumable stores, general stores, maintenance materials and spares, work in progress and finished products. It is of great importance that the bulk of construction materials delivery requires proper management of stock control. Teo and Loosemore (2001) noted that construction activities can generate an enormous amount of waste which is recognized as a major problem in the construction industry, but, tighter materials planning can reduce waste and can directly contribute to profit-improvement and productivity. 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 construction waste can also be reduced by using waste management system on project.

8. Warehousing Management: Monczka (2012) stated that a centralized warehousing is a situation where all materials (raw materials, parts, components, and finished goods) are stored in a specific location where materials are received and delivered to required operating places. Leenders (2012), identified the

importance of warehousing to includes: reduction in transportation cost; warehousing and the associated inventory are added expenses, but they may be traded off with lower cost realized if JIT transportation is adopted; achieving smooth production-warehousing to some levels of inventories make materials available at all time for production process, hence, it helps to avoid stock-out of materials; coordination of supply and demand- firms that experience highly seasonal production and sales most times have problem in coordinating supply with demand of materials, warehouse.

METHODOLOGY

The study adopted the descriptive survey design. Adoption of descriptive survey was in line with Ali (2002) and Nnamdi (2002) who described descriptive survey research design as one in which a group of people or items is studied by collecting and analyzing data from a few people or items that are representative of the entire group. The area of research was Owerri Metropolis in Imo State. The population of this study was two hundred and ninety - four (294) respondents consisting of sixty-one (61) registered architects, one hundred and seven (107) registered builders, seventy-two (72) registered quantity supervisors, fifty-four (54) registered civil engineers and ninety-four (94) ongoing approved construction sites in Owerri Metropolis by Owerri Capital development Authority (OCDA) as of July 2021. The researcher used Taro Yamane formula (1964) to determine a sample size from the total population

$$n = \frac{N}{1+N(e)^2}$$

Where n = Sample Size

N = Population

e² = Margin of error (assumed 5%)

1 = Unity or Constant

Therefore

$$\frac{294}{1 + 294 (0.05)^2}$$

$$= \frac{294}{1 + (294 \times 0.0025)}$$

$$= \frac{294}{1 + 0.735}$$

$$= \frac{294}{1.735}$$

$$= 170.$$

This implies a sample population of 170 will be drawn out of the target population. The instrument for data collection was a structured 58- item questionnaire titled “materials management practices on building construction sites (AMPBCSQ) Questionnaire. The instrument was validated by three experts in Building department. Cronbach Alpha reliability technique was used to determine the reliability of the instrument which yielded an overall reliability coefficient of 0.77.

170 copies of the questionnaire was distributed to the respondents by the researcher with the help of three research assistants. Out of the one hundred and seventy (170) copies of the questionnaire administered to the respondents, one hundred and twenty three (123) copies were completely filled and returned representing 89% rate of return. The descriptive statistics of mean and standard deviation was used to answer the research questions.

RESULTS AND DATA PRESENTATION

One hundred and seventy (170) copies of structured questionnaire were administered to the respondents for this research work i.e. thirty six (36) copies of structured questionnaire were distributed to the Architects and sixty one (61) copies to Builder, thirty two (32) copies to Civil Engineer and forty one (41) copies to Quantity Surveyors that operate in Imo Metropolis State, Nigeria. Only one hundred and twenty

three (123) copies of questionnaire distributed were returned and was used for analyses justifying seventy two percent (72%) response rate.

Table 1: General/ Demographic information of respondents

Demographic variables	Frequency	Percentage (%)
Professional background		
Architect	30	24.3%
Builder	49	39.8%
Quantity Surveyor	29	23.5%
Civil Engineer	15	12.1%
Gender		
Male	82	66.6%
Female	41	33.3%
Years of Experience		
0-5 years	20	16.2%
6-10 years	22	17.8%
11-15 years	31	26.8%
16-20 years above	50	40%
Highest Educational Qualifications		
HND	30	24.3%
B.Sc/B.Tech	40	32.5%
MSc/MPM	31	25.2%
Phd	22	17.8%

Researcher survey 2021

Data in Table above 1, shows that showed that 30(24.3%) of the professional respondents are Architect, 49(39.8%) of the professional respondents are builders, 29(23.5%) of the professional respondents are Quantity Surveyors while 15(12.1%) of the professional respondents are Civil Engineer.

Among the respondents 82(66.6%) accounted for the male counterparts while 41(33.3%) of the respondents are female professional in the construction industry. About 16.2% of the respondents possess 5 years professional experience in the construction industry, 17.8% possess 6-10 years' experience, 26.8% possess over 15 years professional experience and 40% possess 16-20 years' experience. This justified that larger percentage of the respondents were highly qualified and knowledgeable enough to answer the questions

Respondents with HND were found to hold adequate academic qualification constituting 24.3% of the respondents, while the B.Sc/B.Tech of the respondents constituting 32.5% of the respondents, masters degrees are 25.2% while Ph. D Holder are 17.8%. This implies that larger percentage of the respondents were B.Sc/B.Tech holders

Research Question one: *What are the planning /Scheduling/ordering management practices on the sites on building construction sites in Owerri metropolis, Imo State?*

Table 2: Planning /Scheduling/Ordering management practices

S/N	Variables	\bar{x}	SD
1	The specific identification method	3.74	.52
2	The first in first out (FIFO) method	3.73	.51
3	The weighted average method	3.68	.70
4	The last in, first out (LIFO) method	3.71	.53

Source: *Researcher's Field survey (2021)*

The result from Table 2 showed that there was general agreement between the overall means score and the two categories of respondents mean scores ranking on planning /Scheduling/ordering management practices. Firstly ranked was the specific identification method with overall mean score of 1st, (3.74). Followed by the first in first out (FIFO) method with overall mean score of 2nd, (3.73). The weighted average method was ranked 3rd, (3.68), and the last in, first out (LIFO) method was ranked 4th, (3.71).

Research Question two: *What is the procurement/purchasing materials management practices on building construction sites in Owerri metropolis, Imo State?*

Table 3: Procurement/ purchasing materials management practices

S/N	Variables	\bar{x}	SD
1	Bulk purchasing method	3.67	.63
2	Hand to mouth purchasing method	3.65	.71
3	Speculative purchasing method	3.57	.67
4	Blanket purchasing method	3.56	.72

Source: *Researcher's Field survey (2021)*

Table 3 addressed procurement/ purchasing materials management practices. It was observed that the respondent firstly ranked was the bulk purchasing method with overall mean score of 1st, (3.67). Followed by the Hand to mouth purchasing method with overall mean score of 2nd, (3.65). The speculative purchasing method was ranked 3rd, (3.57), Blanket purchasing method was ranked 4th, (3.56).

Research Question three: *What are the transport management practices on building construction sites in Owerri metropolis, Imo State?*

Table 4: Material Transport management practices

C	Material Transport practices	\bar{x}	SD
1	Open deck vehicles.	3.52	.82
2	Trucks/ lorry.	3.50	.75
3	Enclosed vans.	3.49	.71
4	Motorcycle	3.48	.77

Source: *Researcher's Field survey (2021)*

Table 4 ranked and compared the mean scores of the building professional on material Transport materials management practices currently practiced on their site with the overall mean score ranking. Five most frequently embraced among the parameters listed on Transport management practices according to overall mean were: open deck vehicles (1st, 3.52), Trailers/truck was ranked (2nd, 3.50), enclosed vans was ranked (3rd, 3.49) and motorcycle was ranked (4th, 3.48).

Research Question four: *What are the material storage management practices on building construction sites in Owerri metropolis, Imo State?*

Table 5: Material storage management practices

D	Material storage practices	\bar{x}	SD
1	Fenced method.	3.62	.63
2	Unfenced method.	3.61	.70
3	Enclosed store method	3.56	.66

Source: *Researcher's Field survey (2021)*

Table 5 ranked and compared the mean scores of the building professional on material storage management currently practiced on their site with the overall mean score ranking. According to the table, the most frequently embraced among the parameters listed on storage management practices according to overall mean were: fenced method (1st, 3.62), un-fenced method was ranked (2nd, 3.61), and enclosed store method was ranked (3rd, 3.56).

Research Question Five: *What are the Material handling management practices on building construction sites in Owerri metropolis, Imo State?*

1.1.5 Material handling management practices

E	Material handling practices	\bar{x}	SD
1	Manual	3.39	.74
2	Forklift truck	3.33	.87
3	Cranes	3.30	.76

Source: *Researcher's Field survey (2021)*

The able above assessed building professional level of agreement on material handling management practices on building construction projects site using some selected material management practices criteria. Table 4.1.5 ranked and compared the mean scores of the building professional on material handling management currently practiced on their building site with the overall mean score ranking. The most frequently embraced among the material handling management parameters listed on building sites according to overall mean were: manual (1st, **3.39**), forklift truck on site (2nd, **3.33**), and cranes (3rd, **3.30**)

Test for Hypothesis

Table 7: ANOVA - test result on current management practice does not significantly affect the construction performance on building construction sites in Owerri Metropolis.

Sources of Variable	DF	Sum of Square	Mean Square	F-value	F-critic	Sig.
Between Group	2	50.4502	25.2251	23.5889	2.99	Significant
Within Group	120	654.4507	1.0694			
Total	122	704.9008				

Since the f-cal of 23.5889 is greater than the f- critical of 2.99, the researcher therefore reject the null hypothesis which asserted that current management practice does not significantly affect the construction performance on building construction sites in Owerri Metropolis. The researcher based on data analyzed above concluded that current management practices significantly affect the construction performance on building construction sites in Owerri Metropolis.

DISCUSSION OF FINDINGS

The study also revealed that, building construction professionals agreed that the specific identification, followed by the first in first out (FIFO) method, weighted average method and last in, first out (LIFO) method, are planning/Scheduling/ordering management practices adopted in construction sites in Owerri. Secondly, procurement/purchasing materials management practices. It was observed that the respondent firstly ranked was the bulk purchasing method, followed by hand to mouth purchasing method, the speculative purchasing method, and blanket purchasing method were not frequently embraced among the parameters listed.

For transport materials management practices currently practiced on their site. The most frequently embraced among the parameters listed on open deck vehicles, followed by trucks/ lorry, enclosed vans and motorcycle. This consistence with Vikram, Rohit, and Mohit (2017) finding that stressed the in order to make materials management on site effective for fast-track projects there needs to be an integrated material handling process from the design stage to the usage of materials. Three important phases that holds the key to a successful materials management are materials purchasing, materials usage, and storage.

Under methods used for storing materials on building projects, it shows that all the respondents agreed that the most methods of storage practices adopted by building construction companies are fenced method, followed by unfenced method and the least methods is enclosed store method. This finding are in line with findings of Theodore (2014) submits that building materials such as cement should be stacked in watertight containers or provision of silos tanks on a building project. Usually for cement bags stacked in

stores they should not be kept for more than one month or else the quality of the material will be affected resulting at times in cement cakes formation. Similarly, Oziegbe (1991) opines that aggregate that are not properly stored will limit the strength of the concrete work on a building project, it could also affect the durability and structural performance of the building. Material handling management practices, the most frequently embraced among the material handling management parameters listed on building sites according to overall mean are manual followed by forklift truck and cranes on site.

CONCLUSION

The following conclusion could be drawn from the research work;

The study has confirm that effective materials management techniques on construction site are important for project success

1. Materials management processes require a transformation to improve 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. The minimization of materials wastage during the construction phases is important in order to avoid loss of profits.
2. Only by proper management of materials in construction sites can aids materials management in Nigeria construction sites, as it aids the speedy completion period, it saves time of execution, it gives high quality works and reduces the materials wastage. Materials management process improves the success rate of project planning and execution thus lowering the project cost.
3. From the projects surveyed, it had been found out that improper material management on site needs be discovered and prevented in order to achieve the desired output, such as; poor site planning, lack of competent operations, inadequate security, wrong ordering of materials, incompetence of the site manager/resident engineer, corrosion and decay of materials when not properly protected from weather, availability of space on site for storing fragile and valuable materials, inexperience personnel, difficulty to transport materials around sites e.t.c. if all these could be put into consideration before resuming any site and all necessary or adequate provisions

RECOMMENDATIONS

Based on the results of this study, the following recommendations are made to foster effective materials management practice of construction projects

1. The construction companies should make use of more than one material management practices on construction projects so as to achieve maximum project delivery success
2. The contractors should ensure effective control of materials from design to construction stage so as to adequately reduce processes that can lead to wastages in construction sites
3. Federal government should create supervisory professional bodies to monitor and oversee material management of builders on site and recommend appropriate sanctions to erring professionals in order to enforce and ensure that the best practices in terms of material management are enthroned and regulated for best result in protection of lives and properties
4. Federal government should as a matter of urgency create or establish construction industry development commission which will be made up of the professionals in the industry to fashion the way forward for the future of the industry

REFERENCES

- Ademeso, O. S. & Windapo, A. O. (2018). *Relationship between Material Management Approach and Scheduled Project Completion Time*. University of Lagos, Akoka-Nigeria
- Adeniyi, R. (2000). Laboratory evaluation of freshly prepared juice from garlic (*Allium sativum* L.) Liliaceae as protectants against the maize weevil, *Sitophilus zeamais* (Motsch.) [Coleoptera: Curculionidae] Construction Materials Management. New York: Marcel Dekker Inc.

- Adeyinka, J. (2014). Teachers' perception of the effects and use of learning materials: *Unpublished Teaching Materials; University Press: Ilorin, Nigeria*,
- Ahuja, N. & Dozzi, S. P. (2014). *Project management techniques in planning and controlling construction projects*, Second Edition, John Wiley and Sons Inc., New York.
- Ammer D. S. (2014). Materials management "as a profit centre"; Harvard Business Review. January February, ed. Harvard- United States.
- Baldva, S. (1997). Thesis, Material management in construction industry, CEPT
- Barrie, D. S. & Paulson, B. C. (2012). Professional construction management: including C.M., design-construct, and general contracting. McGraw Hill, London.
- Bell L. & Stukhart G, (2016). Attributes of materials management systems", *Journal of Construction Engineering and Management*, 112(1), 14-21
- Burt, N. D (2016). *World Class Supply Management: A Key to Supply Chain Management*. McGraw Hill
- Canter, M. R. (2003): *Resource Management for Construction an Integrated Approach*. Macmillan, London.
- Chan, M.R. (2012). *Resource management for construction an integrated approach*. Macmillan; London
- Chandler E.T. (2018). The planning of storage and management on site, special correspondence, London.
- Dania A. A. (2017). A Study of construction material waste management practices by construction firms in Nigeria, department of building, Ahmadu Bello University, Zaria, Kaduna state, Nigeria.
- Donyavi, S & Flanagan, R. (2019). The impact of effective materials management on construction site performance for small and medium sized construction enterprises. *In; Dainty, A.R.J.(Ed) Annual ARCOM Conference, 7-9 September 2009, Nottingham, UK, Association of Researchers in Construction Management*, 11-20.
- Eduardo L (2002). "Material waste in building industry: Main causes and prevention", *Journal of Construction Engineering and management*, 12(4),12-18.
- Frank, T. (2010). A Model of supply chain management for construction using information Technology, Krakow, Poland.
- Idowi, A. (2017). Analyzing Inventory Material Management Control Technique On Residential Construction Project", Vol-2 Issue-3.
- Idowu, A., & Kabir, I. (2019). Impact of materials management practices in the Nigerian construction industry. *Journal of Building Construction and Planning Research*, 5(01), 1-13.
- Johnson, J. E. (2016). *Site control of materials: Handling, Storage and Protection*. Elsevier.
- Kasim, N. B, (2017). Improving Materials Management Practices on fast-track Construction Projects. In; Khosrowshahi, F (Ed). SOAS, University of London. Association of Researchers in Construction Management.
- Khyomesh V. & Chetna M. Vyas. (2011). Construction materials management on project sites' national conference on Recent Trends in Engineering and Technology, B.V.M. Engineering College, V.V. Nagar, Gujarat, India. 13-14, may 2011
- Lamer M. (2017). Improving Construction Site Management Practices Through Knowledge, Ph.d Thesis, Loughborough University.
- Lan C. (2018). *Materials Management on Building site, 1st Edition, London, The construction Press Lancaster*.
- Leenders, R. M. (2012). *Purchasing and Supply Management*. Boston: Mcgraw-Hill Irwin, Twelfth Edition
- Monczka, H. (2012). Management and recycling of demolition waste in Hong Kong. *Waste management and Research* 15(1), 561-572
- Ojo,G. K (2015). Automated project performance control of construction projects. *Automation in Construction*, 14(4), 467-476.
- Paul N. (2017). More than Materials; Managing What's need to create value in Construction 2nd European Conference on Construction Logistics ECCI, Dortmund, Germany.

- Payne, A. C., Cliclsoin, J. V. & Rcahill, LR. P. (2016). *Management for engineers*. John Wiley and Sons, England.
- Prabu, V. & Baker, M. (2016). Materials management UK: McGraw-Hill Project Delivery in the Nigerian Construction Industry. *International Journal of Built Environment and Sustainability*, 4(1). 56-62
- Sadiwala, R. (2017). Automated model for materials management and control. *Construction Automation Laboratory – Faculty of Civil Engineering, Technion City*.
- 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.
- Teo, M. M. M. and Loosemore, M. (2001): A theory of waste behavior in the construction industry. *Construction Management and Economics*, 19(7), 741-751.
- Tompkins, J. A & White, J A (2014). *Facilities Planning*. New York: John Wiley and Sons.