



MATERIALS MANAGEMENT AND PROJECT DELIVERY OF CONSTRUCTION FIRMS

Ugochi Sandra Uzoho
Frank Alaba Ogedengbe¹
Francis Sylvanus Udoh

Received 30.05.2023.
Received in revised form 19.08.2023.
Accepted 23.09.2023.
UDC – 005.8

Keywords:

*Materials Management, Planning,
Transport, Purchasing, Storage,
Project Delivery*

ABSTRACT

Successful project delivery is essential for economic growth and infrastructure development. This study looked at construction companies' management of materials. The improper handling of materials affects how well projects are completed. Inadequate material management could seriously hinder the realisation of projects. 291 employees from Habitat and Building Concepts Limited and Dantata & Sawoe Construction Company (Nigeria) Limited made up both the study's population and sample, which used descriptive survey research design. Information from the respondents via standardised questionnaire were regressed using the Statistical Package for Social Sciences. Result shows transportation (.03+1.82), purchasing (.03+0.73), and storage (.03+1.11), had a favourable and significant impact on project delivery. While planning (03-0.15) had a negative but minor impact on project delivery. The study advises Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited accordingly. Managers should manage materials adequately and decide on efficient means of transportation, procurement, and storage.



© 2024 Published by Faculty of Engineering

1. INTRODUCTION

The production by a country over time is known as its gross domestic product and it measures its wealth on a global scale. The provision of some valuable activity, such as banking, healthcare, mining, retail, real estate, or social services, which are only potential sources of profit, is referred to as a service. The transformation of raw resources into usable items requires a production function. Production occurs during all types of transformations, including mining, farming, logging, and fishing, as well as when these resources are used to create usable goods. Therefore, the successful

implementation of projects requires effective management of all resources.

Nigeria's development is anchored on the construction sector, a key engine of economic expansion and urbanisation. Successful project delivery is pivotal, not only for economic advancement but also for infrastructure development and job creation (Afolabi, et al., 2019). Timely and cost-effective project completion is a shared goal among construction firms, government agencies, and stakeholders. Project delivery in construction is a multifaceted concept encompassing the successful execution of projects within specified timeframes, budgets, and quality standards (Ogunlana & Promkuntong, 2000). It is a complex process influenced

¹ Corresponding author: Frank Alaba Ogedengbe
Email: frank.ogedengbe@nileuniversity.edu.ng

by various factors, including project management practices, labour, technology, and materials management. Efficient materials management stands out as a crucial determinant of project delivery performance. It encompasses the acquisition, storage, transportation, and utilization of construction materials throughout the project life cycle (Gangoellis et al., 2015). Effective materials management ensures that the right materials are available when needed, minimizing project delays and cost overruns.

In Nigeria, the construction sector faces challenges that often lead to project delivery delays and cost escalations. These challenges include inefficient materials procurement, inadequate inventory control, unreliable supply chains, and poor logistics (Nwachukwu et al., 2010). Considering these challenges, the significance of materials management in achieving successful project delivery becomes evident. However, the specific context of Nigerian construction firms requires focused examination, as local conditions and constraints can significantly impact materials management practices and, consequently, project delivery outcomes.

This study is about how materials management practices affect project execution in a few Nigerian construction firms. It will delve into various aspects of materials management, including procurement processes, inventory control methods, transportation, and the utilization of technology. By understanding the interplay between materials management and project delivery in the Nigerian construction industry, this research seeks to offer insights, best practices, and recommendations for improving project delivery efficiency.

The inappropriate management of materials during site activities has become a significant issue that has a negative impact on how building projects operate over time. The inappropriate handling and management of materials on construction sites has the potential to severely hamper project performance (Ogunlana, et al., 1996). The main problem of construction firms in Nigeria is that they frequently experience project failures that can be traced to ineffective material management. Poor initial planning, inadequate purchasing practices, material deterioration owing to inadequate storage facilities, and transport delays all contribute to project delays. These difficulties show up in projects as work stops owing to material shortages, surplus materials on site, inadequate storage space, uncontrolled material waste, damaged materials on site, and improper material purchases.

The following hypotheses were examined and expressed in their null form:

Ho₁: Planning materials management has no significant impact on the effectiveness of construction firms in Nigeria.

Ho₂: Transport materials management has no significant impact on the effectiveness of construction firms in Nigeria.

Ho₃: Purchasing materials management has no significant impact on the effectiveness of construction firms in Nigeria.

Ho₄: Storage materials management has no significant impact on the effectiveness of construction firms in Nigeria.

2. LITERATURE REVIEW

Construction activity planning, execution, and monitoring is known as materials management. Making sure construction supplies are readily accessible on demand is the goal of materials management. Materials management refers to principles and practices that effectively reduce the cost of materials used in a project. Material management is an area of responsibility that begins with the selection of a supplier and ends with the delivery of the material to its destination (Yadhun and Shrinath, 2022). They further stated that material management is about the planning, procurement, storage, and quality and quantity of appropriate materials at the right place and time to coordinate and plan construction activities. Material management is a unified concept of a human resource organization that includes all functions and line responsibilities, starting with selection and staffing, with a special focus on material flows in and within the organization.

Materials management involves several processes that must be integrated, organized, and controlled so that materials are available when needed. The website's material request triggers the beginning of the material management procedure, which also includes resource requests for the shop and indenting. Typically, the lowest-value supplier and best materials are obtained from the shop, and inspection is carried out (Patil and Pataskar, 2013).

Project planning technology is the basis for determining the success of the project as well as its reality. Most building or construction projects experience delays in several ways that lead to longer project delivery time due to neglect of management of resource-based factors i.e., components such as material, labour, and installation because they even hurt the cost of the project if not looked at correctly (Andawei, Nicknames, and Openebo, 2017). The design processes appear to be exceedingly laborious, complicated, and time-consuming. In light of these circumstances, the goal of the research is to evaluate the influence of the preparation of projects on contract delivery and execution in the Nigerian construction sector while accounting for contractors' returns. The scarcity of published studies on increasing contractor construction project income is a significant study restriction.

Transport is a concept emphasizing movement, which includes the planning, execution, and movement of all goods, as well as the storage of raw materials to finished products according to customer needs (Stukhart, 2015). Construction raw materials are usually different, thick, and heavy and require proper handling in the delivery process. Therefore, the construction industry requires the active movement of materials from suppliers to the production area both in the factory and on the construction site (Pheng and Chuan, 2011). The focus of the logistics concept in construction projects is to improve coordination and communication between project participants during the phases of design and construction, especially in the process of managing material flow (Agapiou et al., 2018). They also mentioned that there are problems in the material flow control process, which include delays in the delivery of materials because some materials are purchased just before they are needed, and waste of materials in storage, handling, and transportation when they are obtained without bulk amounts production needs (Agapiou et al., 2018). Previous studies have shown that material routing is one of the most important cost and time factors during construction projects (Varghese and O'Connor, 2015).

Purchasing has the responsibility and authority to commit to material projects through an appropriate supplier (Obiegbu, 2019). To ensure that there are materials available on construction sites, purchasing includes acquiring all the equipment, supplies, and materials required for the running and upkeep of the organization. This responsibility includes getting the right the standard at the appropriate cost, from an appropriate vendor, and at the right moment in time. The primary requirement of materials management is the purchasing function. Purchasing is a broader purchasing activity or part of purchasing that includes making, receiving, expediting, and ordering payments (Schiele, 2019). The buying department's job is to procure the products, components, resources, and other supplies required for the creation of products or the delivery of services.

Purchases are broadly divided into two categories: small and large, and categories based on the characteristics of the materials being purchased, such as economic value, variability, fragility, significance, complexity, technology, and quantity. Similarly, procurement management involves implementing the strategic and managerial objectives of the business by controlling and planning purchases of goods and other resources from suppliers. The manager responsible for procurement must be in contact with customers internally or externally. The dual role of purchasing management is widely considered to be a complex job involving complex tasks related to the convergence of upstream and downstream and external and internal supply chain management functions (Jahani et al., 2021).

Storage of materials on a construction site requires careful attention to avoid wastage, wastage, and damage to materials that affect the operation of a construction project. Problems in the supply of materials often occur due to improper storage and protective facilities (Canter, 2013). Previous studies have shown that construction materials often require large storage volumes that are rarely available on-site (Agapiou et al., 2018). However, Stukhart (2015) suggested that there are some aspects to consider when designing a storage space, such as the timing of the initial purchase and historical knowledge and experience. The goal of on-site material management should be to reduce losses caused by theft, damage and disposal, and out-of-stocks. As a result, the need for storage facilities must be considered from the beginning of the building procedure.

Meeting client expectations is what is meant by project delivery; the project client obtains what has been specified and agreed upon by the chosen project implementers. The delivery of the task must be completed promptly, on estimate, and with high grade - this is exactly what the client requires from the developers. In other words, project delivery means that the client expects certain project products that the developers have created according to their contracts and project plans (Bon-Gang, 2019). He further notes that the project delivery method is a process where different stakeholders work together to deliver the building; it is usually distinguished by two main characteristics: (i) the contractual relationship between the project stakeholders and (ii) the time of their participation in the project (Bon-Gang, 2019).

Project delivery refers to the complete process in which projects such as the construction or renovation of a property or building are carried out and completed. It requires careful planning, design, and construction measures from various parties. A project delivery system requires multiple roles, standards, and defined procedures to function.

3. THEORETICAL FRAMEWORK

3.1 Inventory Management Theory

The theoretical framework that best suits this study is the inventory management theory as put forth by Nowicka-Skowron (2007). It claims that the network of goods and data movement is heavily reliant on the materials' accessibility and the calibre of knowledge the chain administrator has access to. For the chosen Nigerian construction companies, the goal of inventory theory is to identify guidelines that organizing materials can utilize to reduce the costs of sustaining material management and satisfying client demand.

4. EMPIRICAL REVIEW

Akinola, Oyewole, Olaleye, and Ibrahim (2022) investigated the extent of materials management practices among 59 listed manufacturing firms through a descriptive study. A structured questionnaire that had been updated and validated was used to collect the necessary data. 354 personnel in a variety of roles, including purchasing supervisor, logistics manager, retail supervisor, production supervisor, research and development supervisor, and a bookkeeper, were reached utilising a multistage sampling approach. Both descriptive and inferential statistics were applied to the data analysis. The findings demonstrated that Southwest Nigerian manufacturing enterprises had extensive material management techniques, including stock and preservation, industrial and purchasing, shipment, planning and oversight of production, and inventory management. The study did, however, demonstrate that the administration of materials has been extremely effective in enhancing the financial health of industrial firms in Southwest Nigeria.

Egwuatu (2022) investigated the relationships between materials management and organizational productivity in plastic manufacturing companies in Anambra State, Nigeria. The research strategy was used. The participants in the study were 1648 employees of plastic manufacturing companies in Anambra State, Nigeria, while the sample size consisted of 321 employees of plastic manufacturing companies. Borg and Gall used to determine the sample size. To make sure the instrument was legitimate, face and content validity was applied. Using the resting way of testing, device dependability was attained. The research topics were addressed using a straightforward percentage analysis. Pearson product moment correlation coefficient analysis was used to test the hypotheses. Material management has an important relationship with the productivity of the plastic industry organization in Anambra State.

Tanveer, Zafar and Shahid (2022) investigated the impact of materials management on the performance of textile manufacturing companies in Pakistan. Descriptive research was adopted in the study. Data on six textile firms in Islamabad were gathered for the study. Surveys were utilised to get the data. Data were gathered for the study using standardized questionnaires. Inferential and the data were examined using descriptive statistics as well. Tables were used to present the research findings. The study discovered that performance is impacted by material management. It was discovered that materials management significantly and favourably affects the productivity of Pakistani textile manufacturing firms.

Essel (2021) researched the effect of material management on the performance of manufacturing firms, particularly the chosen cement companies. A purposive sampling technique was adopted, and 20

employees from the purchasing, store, and logistics departments of the selected cement business were specially chosen, totalling 40 participants as the sample size for the study. Multiple regression analysis was applied to do the data analysis. Results showed that the various aspects of materials management work together to significantly improve business performance. The study also showed that only storage of materials had a major impact on business performance, with buying, interdepartmental collaboration, and inventory having negligible effects.

The effect of material management on the performance level of fast-moving consumer goods firms in Italy was studied by Rey-Ares et al. in 2021. The study design and questionnaire were essential instruments for gathering data since they used two metrics of material management and performance aspects. 470 participants received surveys, and the data gathered was evaluated using canonical correlation. The results of a conventional correlation study showed that there was a statistically significant correlation between the mix of material efficiency and output and the sets of material management that were influenced by raw materials and work-in-progress.

Wayrah, Sarpin, Mohamed and Masrom (2021) investigated how materials management practices affected the completion of construction projects in Somalia. Survey questionnaire was carried out. According to the findings, the present method for managing material in building projects in Somalia includes identifying the necessary materials, considering the layout and location of the site, materials that are close by, materials that meet requirements, and materials that are delivered on time. The study also discovered that poor material management has a detrimental influence on the overall processing of materials and the efficient execution of projects on site.

The effect of materials management on construction projects was examined by Sila and Gakobo (2021). a quantitative investigation approach was used for the study, which targeted 40 participants from different construction firms in Nairobi City County. Using SPSS software, regression analysis was done between four variables: organizing, storage, shipping, and purchase. The study concluded that construction organizations had poor levels of material management competency due to insufficient handling of materials.

5. METHODOLOGY

The study can be classified as quantitative descriptive research since it relies on more formal and representative samples than exploratory research (Malhotra, 2011). In this scenario, statistical variables defining the links between planning, transport, storage, purchasing, and efficacy are used to help the analysis of the data. The study is a survey, with a fixed sample of

subjects, each of which was interviewed twice over a period (Malhotra, 2011). Primary information was gathered from Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited both in Abuja.

A self-administered survey was used to collect the data, which was standardised using structured statements and a pre-established framework for responses. The questionnaire employed responses that were itemised using a 5-point Likert scale and non-comparative measures. Due to the study's longitudinal nature, two different types of surveys were needed, each with a different set of questions. The first one gathered data on material management and performance; the second, was used to determine whether respondents' working effort

had been impacted and to identify potential causes of gaps between materials management and effectiveness.

Multiple regression analysis was used for the data evaluation to test the study hypotheses. The two construction enterprises were examined using multi-group analysis. The table 1 lists the population of construction companies used.

6. SAMPLE SIZE AND SAMPLING TECHNIQUE

Because the working population is not more than four hundred, we adopted the 291 as the sample, that is, the census sampling technique was adopted.

Table 1. Selected Construction Firms and Management in Abuja, Nigeria

Construction Companies Abuja	Project Team Members	Project Managers	Employees
Dantata & Sawoe Construction Company	189	26	215
Habitat and Building Concepts	65	11	76
TOTAL	254	37	291

Source: Federation of Construction Industry (2023)

7. VALIDITY AND RELIABILITY OF INSTRUMENT

Internal consistency approach was employed to gauge the dependability of the instruments using Cronbach's Alpha. Coefficient of 0.7 is a commonly accepted rule of thumb that indicates acceptable reliability and 0.8 or

higher indicate good reliability (Kothari, 2019). A value of 0.8 was therefore considered appropriate for the investigation.

The results in the table show the variables are dependable because their Alpha values are more than 0.8. (Table 2).

Table 2. Scale reliability of variables

Variables	Cronbach's Alpha
Planning Materials	0.80
Transport Materials	0.84
Purchasing Materials	0.81
Storage Materials	0.85
Project Delivery (effectiveness)	0.87

Source: Author's computation (2023)

8. MODEL SPECIFICATION

Multiple regression model was employed in evaluating the impact of materials management on the performance of the chosen construction firms in Abuja, Nigeria. The Independent variable is materials management comprising, planning, transport, purchasing and storage materials management, and dependent variable which is project delivery of construction firms. The study adopted the model Akinola, et al., (2022) who ascertained material management practices and quoted manufacturing companies with a slight modification to suit this work is displayed below:

$$Y = \alpha + \beta_1 X \tag{1}$$

Where y = dependent variable, α = intercept, β_1 is coefficient and x is the independent variable. However, the above model shall be expressed as:

$$PRD = \alpha + \beta_1 PLA + \beta_2 TRA + \beta_3 PUR + \beta_4 STO + \mu \tag{2}$$

Where:
 PRD = Project Delivery (measured as effectiveness)
 PLA = Planning
 TRA = Transport
 PUR = Purchasing
 STO = Storage
 β = Independent variable
 α = Intercept and
 μ = Error terms

9. ANALYSIS AND RESULTS

291 copies of the questionnaire were administered and a successful return rate of 291 was achieved, representing a response rate of 100%. The data presented here are the demographic profiles of the responders.

The outcomes of the respondent's demographic data are shown in Table 3. Those who responded were additionally prompted to put their age range on the questionnaire that was given out. Only 24.40 percent of the population was under 30 years old, 32.99% was between 30 and 39 years old, 23.02 percent was between 40 and 49 years old, 13.06 percent was

between 50 and 59 years old, and 3.78% was 60 years of age or more, according to the compiled statistics. The findings show that most responders were of an age where they could decide with knowledge about how materials management affected the execution of projects in the construction company.

Table 3. Demographic Characteristics of Responders

Demographic Characteristics	Categories	Frequency	Percent
Age	30 years or younger	71	24.40
	31 years or older	96	32.99
	40 years or older	67	23.02
	50 years or older	46	13.06
	60 years or older	11	3.78
	Sub-Total	291	100.0
Position of Respondent	Managers	37	12.71
	Team-manager	254	87.29
	Others	0	0.00
	Sub-Total	291	100.0
Level of Education	OND/NCE	81	27.84
	BSc/HND/B.Ed.	153	52.58
	Master's degree	57	19.59
	Sub-Total	291	100.0
Years of Experience	Less than 5years	77	26.46
	5 - 10 years	131	45.02
	Above 10 years	83	28.52
	Sub-Total	291	100.0

Source: Researcher field survey data, 2023

Table 3 also reveals the results of the respondent's position specification. The results show that the majority 87.29% of the responders interviewed were project team managers, while 12.71% were project managers and others had 0%. It is clear from the size of the sampled workforce that the chosen construction companies excel at managing project teams.

The results of the demographic data taken into consideration of the responders' educational attainment are shown in Table 3. The degree of education data was gathered to evaluate the respondent's subject matter expertise. The findings on the greatest level of academic degree demonstrated that 52.58% of the people surveyed were Degree (BSc/HND/B.Ed.) owners, 19.59% were master's graduates, and 27.84% were OND/NCE certificate graduates.

To ascertain whether responders had acquired the essential experiences in the firms to offer a valid view on materials administration and project completion in the organization, Table 3 also shows how long participants were employed in the Abuja construction firm. Results show that 28.52% of responders had worked for more than ten years in Abuja's construction firms, 45.02% had more than five years of experience there, and 26.46% had laboured for less than five years. Because most responders had more than five years of work experience, it is assumed that they could make decisions about the management of materials in building firms.

10. TEST OF HYPOTHESES

In table 4, it indicates that 34.02% of the responders strongly agree that the selected construction company planning ensures a regular and safe flow of production. 28.18% of the responders concurred that the selected construction company planning ensures a regular and sasafelow of production, and 5.84% of the responders were undecided. 16.49% of the responders strongly disagreed that the selected construction company planning ensures a regular and sasafelow of production and 15.46% of the responders concurred that the selected construction company planning ensures a regular and safe flow of production.

Also, in the same table, it indicates that 38.14% of the participants strongly concurred that planning of materials by the selected construction company ensures maximum capacity of production and reduces idle time. 32.30% of the participants concurred with the statement in Nigeria, while 6.87% of the responders were undecided. 10.31% of the responders strongly disagreed that planning of materials by the selected construction company ensures maximum capacity of production and reduce idle time and 12.37% of the responders disagreed that planning of materials by the selected construction company ensures maximum capacity of production and reduce idle time.

Finally, table 4 demonstrates that 30.58% of the responders strongly concurred that planning ensures more effective use of equipment by the selected

construction company. 42.27% of the responders concurred that planning ensures more effective use of equipment by the selected construction company. 8.59% were undecided. But 8.93% of the responders strongly disagreed that planning ensures more effective use of

equipment by the selected construction company and 9.62% of the responders concurred that planning ensures more effective use of equipment by the selected construction company.

Table 4. Planning Material Management

Items	5(SA)	4(A)	3(UN)	2(SDA)	1(DA)
The selected construction company planning ensures a regular and safe flow of production	99 (34.02)	82 (28.18)	17 (5.84)	48 (16.49)	45 (15.46)
Planning of materials by the selected construction company ensures maximum capacity of production and reduces idle time	111 (38.14)	94 (32.30)	20 (6.87)	30 (10.31)	36 (12.37)
Planning ensures more effective use of equipment by the selected construction company	89 (30.58)	123 (42.27)	25 (8.59)	26 (8.93)	28 (9.62)

Source: Survey, 2023

Table 5 shows that 31.62% of respondents strongly agree that the distributional efficiency is increased by the building company's chosen transportation channel. 37.11% of respondents agreed that the chosen construction company's transportation method improves distributional efficiency, while 5.50% were unsure. 13.06% of the responders strongly disagreed that the transportation channel in the selected construction company increases distributional efficiency and 12.71% of the responders concurred that the transportation channel in the selected construction company increases distributional efficiency.

It also indicates that 25.43% of the participants vehemently concurred that the transportation channel assist in executing the price mechanism between the construction company and the final consumer. 30.24% of the responders concurred to the statement in Nigeria, while 7.90% of the participants were unsure. 18.90% of the responders strongly disagreed that the transportation channel assist in executing the price mechanism between the construction company and the final consumer and 17.53% of the responders disagreed that the transportation channel assist in executing the price mechanism between the construction company and the final consumer.

Table 5. Transport Material Management

Items	5(SA)	4(A)	3(UN)	2(SDA)	1(DA)
The transportation channel in the selected construction company increases distributional efficiency	92 (31.62)	108 (37.11)	16 (5.50)	38 (13.06)	37 (12.71)
The transportation channel assist in executing the price mechanism between the construction company and the final consumer	74 (25.43)	88 (30.24)	23 (7.90)	55 (18.90)	51 (17.53)
The transportation and logistics assist in product merchandising	90 (30.93)	105 (36.08)	12 (4.12)	49 (16.84)	35 (12.03)

Source: Survey, 2023

Finally, table 5 indicates that 30.93% of the responders strongly concurred that the transportation and logistics assist in product merchandising. 36.08% of the responders concurred the transportation and logistics assist in product merchandising. 4.12% were undecided. But 16.84% of the responders strongly disagreed that the transportation and logistics assist in product merchandising and 12.03% of the responders concurred that the transportation and logistics assist in product merchandising.

source and 12.71% of the responders concurred that your construction company's production and purchasing department helps to determine when to buy and what to source.

In table 6, it indicates that 23.02% of the responders strongly agree that your construction company's production and purchasing department helps to determine when to buy and what to source. 39.18% of the responders concurred that your construction company's production and purchasing department helps to determine when to buy and what to source, and 5.50 percent of respondents were unsure. 19.59% of respondents firmly disagreed with this, your construction company's production and purchasing department helps to determine when to buy and what to

It indicates that 21.65% of the responders strongly concurred that the purchasing department in the selected construction company helps to identify better source for material used. 25.43% of the responders concurred to the statement in Nigeria, 9.28% of respondents were unsure, though. 21.99% of respondents firmly disagreed with this, the purchasing department in the selected construction company helps to identify better source for material used and 21.65% of the responders disagreed that the purchasing department in the selected construction company helps to identify better source for material used.

Finally, table 6 indicates that 29.55% of the responders strongly concurred that the purchasing department in the selected construction company helps to reduce risk or loss of product. 37.11% of the responders concurred the

purchasing department in the selected construction company helps to reduce risk or loss of product. 6.19% were undecided. But 16.15% of the responders strongly dis that the purchasing department in the selected

construction company helps to reduce risk or loss of product and 11.00% of the responders concurred that the purchasing department in the selected construction company helps to reduce risk or loss of product.

Table 6. Purchasing Material Management

Items	5(SA)	4(A)	3(UN)	2(SDA)	1(DA)
Your construction company’s production and purchasing department helps to determine when to buy and what to source	67 (23.02)	114 (39.18)	16 (5.50)	57 (19.59)	37 (12.71)
The purchasing department in the selected construction company helps to identify better source for material used	63 (21.65)	74 (25.43)	27 (9.28)	64 (21.99)	63 (21.65)
The purchasing department in the selected construction company helps to reduce risk or loss of product	86 (29.55)	108 (37.11)	18 (6.19)	47 (16.15)	32 (11.00)

In table 7, it indicates that 32.30% of the responders strongly agree that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always. 27.49% of the responders concurred that y stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always, and 6.53% of the responders were undecided. 15.46% of the responders strongly disagreed that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always and 18.21% of the responders concurred that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always.

while 9.28% of the responders were undecided. 26.46% of the responders strongly disagreed that the store department in the selected construction company operates a made to stock inventory system pending when demands arises and 23.71% of the responders disagreed that the store department in the selected construction company operates a made to stock inventory system pending when demands arises.

The same table shows that 17.87% of the responders strongly concurred that the store department in the selected construction company operates a made to stock inventory system pending when demands arises. 22.68% of the responders concurred to the statement in Nigeria,

It further shows that 35.05 percent of respondents strongly agreed that the warehouse of the chosen construction company is adequate for storing the firm's goods. 30.93% of the responders concurred that the warehouse of the selected construction company is large enough to store the company’s products. 3.78% were undecided. But 16.49% of the responders strongly disagreed that the warehouse of the selected construction company is large enough to store the company’s products and 13.75% of the responders concurred that the warehouse of the selected construction company is large enough to store the company’s products.

Table 7. Storage Material Management

Items	5(SA)	4(A)	3(UN)	2(SDA)	1(DA)
Stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always	94 (32.30)	80 (27.49)	19 (6.53)	45 (15.46)	53 (18.21)
The store department in the selected construction company operates a made to stock inventory system pending when demands arises	52 (17.87)	66 (22.68)	27 (9.28)	77 (26.46)	69 (23.71)
The warehouse of the selected construction company is large enough to store the company’s products	102 (35.05)	90 (30.93)	11 (3.78)	48 (16.49)	40 (13.75)

Source: Survey, 2023

In table 7, it indicates that 32.30% of the responders strongly agree that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always. 27.49% of the responders concurred that y stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always, and 6.53% of the responders were undecided. 15.46% of the responders strongly disagreed that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always and 18.21% of the responders

concurred that stock replenishment is done continually by the store department in the selected construction company which helps materials to be available always.

The same table shows that 17.87% of the responders strongly concurred that the store department in the selected construction company operates a made to stock inventory system pending when demands arises. 22.68% of the responders concurred to the statement in Nigeria, while 9.28% of the responders were undecided. 26.46% of the responders strongly disagreed that the store department in the selected construction company operates a made to stock inventory system pending

when demands arises and 23.71% of the responders disagreed that the store department in the selected construction company operates a made to stock inventory system pending when demands arises.

It further shows that 35.05 percent of respondents strongly agreed that the warehouse of the chosen construction company is adequate for storing the firm's goods. 30.93% of the responders concurred that the warehouse of the selected construction company is large enough to store the company's products. 3.78% were undecided. But 16.49% of the responders strongly disagreed that the warehouse of the selected construction company is large enough to store the company's products and 13.75% of the responders concurred that the warehouse of the selected construction company is large enough to store the company's products.

In table 8, it indicates that 18.21% of the responders strongly agree that poor delivery of project cost affects the outcome of construction project. 20.96% of the responders concurred that poor delivery of project cost affects the outcome of construction project, and 7.22% of the responders were undecided. 28.87% of the responders strongly disagreed that poor delivery of project cost affects the outcome of construction project and 24.74% of the responders concurred that poor delivery of project cost affects the outcome of construction project.

Also, in same table, it indicates that 14.78% of the responders strongly concurred that the selected construction firms' managers materials management experience negative influences during building construction projects in Abuja. 22.68% of the responders concurred to the statement in Nigeria, while 8.24% of the responders were undecided. 32.98% of the responders strongly disagreed that the selected construction firms' managers materials management experience negative influences during building construction projects in Abuja and 21.30% of the responders disagreed that the selected construction firms' managers materials management experience negative influences during building construction projects in Abuja.

Finally, table 8, indicates that 24.40% of the responders strongly concurred that regulatory surveillance of the control of the selected construction firms affect project delivery of the construction project. 28.18% of the responders concurred that regulatory surveillance of the control of the selected construction firms affect project delivery of the construction project. 6.87% were undecided. But 20.61% of the responders strongly disagreed that regulatory surveillance of the control of the selected construction firms affect project delivery of the construction project and 19.93% of the responders concurred that regulatory surveillance of the control of the selected construction firms affect project delivery of the construction project.

Table 8. Project Delivery (Effectiveness)

Items	5(SDA)	4(DA)	3(UN)	2(SA)	1(A)
Poor delivery of project cost affects the outcome (effectiveness) of construction project	53 (18.21)	61 (20.96)	21 (7.22)	84 (28.87)	72 (24.74)
The selected construction firms' managers materials management experience negative influences during building construction projects in Abuja	43 (14.78)	66 (22.68)	24 (8.24)	96 (32.98)	62 (21.30)
Regulatory surveillance of the control of the selected construction firms affects project delivery (effectiveness) of the construction project	71 (24.40)	82 (28.18)	20 (6.87)	60 (20.61)	58 (19.93)

Source: Survey, 2023

The findings of the descriptive statistics were shown in a table along with the mean, range, standard deviation, and variance. The selected construction firms in Abuja have a mean project delivery value of 2.71, a mean

planning value of 3.26, a mean transport value of 3.16, a mean purchasing value of 2.88, and a mean storage value of 2.73. Each of the previously listed variables' standard deviations were also included in the table 9.

Table 9. Result of Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PRD	291	1.00	5.00	2.7113	1.47118
PLA	291	1.00	5.00	3.2662	1.90324
TRA	291	1.00	5.00	3.1640	1.88115
PUR	291	1.00	5.00	2.8816	1.33650
STO	291	1.00	5.00	2.7329	1.87214
Valid N (listwise)	291				

Source: SPSS, 20 Version, 2023

According to the regression results (table 10), the project delivery of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building

Concepts Limited, Nigeria, can be explained by only 84% of variation in materials management, with the remaining 16% being explained by other factors not

included in the regression model, known as error terms. Since the f-statistics is significant at the 5% level of significance, the regression result demonstrates that the model is appropriate for the investigation. The outcome suggests that materials administration, including planning, transport, purchasing, and storage, has an important and beneficial effect on the project delivery of Habitat and Building Concepts Limited in Abuja and Dantata & Sawoe Construction Company (Nigeria) Limited.

The coefficient of materials management (planning) has negative impact on project delivery of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat

and Building Concepts Limited, Nigeria. The $PLA = .03 - 0.15$ shows that project delivery by Habitat and Building Concepts Limited and Dantata & Sawoe Construction Company (Nigeria) Limited will decline by 15% for every 3% increase in planning. The standard error value of 0.073 is higher than the t-statistic value and the p-value of 0.00 is less than the t-statistic value of (-10.81), indicating that planning has a negative and negligible impact on the project delivery of Habitat and Building Concepts Limited and Dantata & Sawoe Construction Company (Nigeria) Limited in Abuja. We therefore rule out the alternative hypotheses and conclude that the effectiveness of the chosen Nigerian construction enterprises is negatively and negligibly impacted by planning materials management.

Table 10. Regression Result

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663 ^a	.847	.772	.08503

a. Predictors: (Constant), PLA, TRA, PUR, STO

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	741.753	2	442.532	1701.106	.000 ^b
	Residual	37.646	289	.212		
	Total	551.223	290			

a. Dependent Variable: PRD

b. Predictors: (Constant), PLA, TRA, PUR, STO

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.039	.044		-7.315	.000
	PLA	-0.157	.059	.731	-10.818	.001
	TRA	1.822	.033	.693	9.723	.000
	PUR	.730	.315	.538	5.300	.000
	STO	1.116	.171	.283	7.522	.020

a. Dependent Variable: PRD

Furthermore, the coefficient of materials management (transport, purchasing and storage) has positive impact on project delivery of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited in Abuja, Nigeria. The $TRA = .03 + 1.82$; $PUR = .03 + 0.73$ and $STO = .03 + 1.11$ which all indicates that project delivery (effectiveness) of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited, Nigeria will increase by every 82%; 73% and 11% for every 3% increase in transport, purchasing and storage respectively. The p-value of 0.01, 0.00 and 0.20 is less than the t-statistic value of (9.72, 5.30 and 7.52) and the standard error value of 0.069, 0.053 and 0.028 is less than the t-statistic value which implies that there is a positive and significant impact of transport, purchasing

and storage materials on project delivery of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited, Nigeria.

As a result, we reject the null hypothesis, accept the alternative hypothesis, and draw the following conclusion that transport, purchasing and storage materials has a positive and significant impact on the effectiveness of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited, Nigeria.

11. DISCUSSION OF FINDINGS

From the regression table of 10, the result of the analysis indicated that there is a positive and significant

impact of materials management on materials management (transport, purchasing and storage) on project delivery of Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited in Abuja, Nigeria. This means that materials management (planning, transport, purchasing and storage) positively and significantly impact the project delivery of the construction firms in Abuja, Nigeria. From this finding, it was observed that the study from the objectives relates to the impact of planning materials management on the effectiveness of construction firms and how they plan for materials procurement, allocation, and utilization. For the impact of transport materials management, addresses transportation and logistics strategies employed by the construction firms, the role of transportation in project delivery, including its impact on project timelines and costs. Purchasing materials management, consider investigating the procurement practices and strategies employed by the construction firms, present data on the relationship between purchasing materials management and project cost control, including cost overruns or savings. Storage materials management, evaluate the storage and inventory control practices observed in the construction firms.

Examine whether effective storage practices lead to better project outcomes, reduced material wastage, and improved project timelines identifying any challenges or deficiencies identified in storage materials management and their consequences for project delivery.

In each discussion, it is essential to draw connections between the specific aspect of materials management being studied and its effect on overall project effectiveness. In agreement with the findings of Akinola, et al., (2022) who ascertained the extent of material management practices among fifty-nine quoted manufacturing companies through a descriptive survey research design and the results revealed that the extent of materials management practices among the Nigerian manufacturing companies in Southwestern was high, and positively related. Also, the works of Egwuatu, (2022) who investigated the relationship between material management and organizational productivity in plastic manufacturing companies in Anambra State, Nigeria, found out that material handling has a positive significant relationship with organizational productivity in plastic manufacturing company.

Furthermore, the findings of Tanveer, et al., (2022) who examined the impact of material management on the performance of textile manufacturing firms in Pakistan found that material management has an impact on performance. Finally, the results are in line with those of Essel (2021). The chosen Nigerian construction companies' utilising inventory theory will help to reduce material administration costs by offering guidance for

managing materials. Inventory material control is ideal for assisting construction companies in making significant financial savings.

12. CONCLUSION

The study concludes that materials management has a positive impact on how materials are handled generally, resulting in increased productivity and efficiency for the chosen construction companies involved in this task. This is because of the impact proper handling of building components has on the total project delivery in terms of purchase, shipping, and storage. The completion pace of the project's preparation and accomplishment is not improved by materials management, increasing project cost. Reducing material waste, by keeping some of the resources, during the building stages is crucial to revenue loss. It was discovered that material planning would indirectly affect project delivery. Effective material scheduling will guarantee on-time project start-up and on-budget project completion.

The following recommendations were therefore made based on the outcomes and findings of the investigations.

- I. Dantata & Sawoe Construction Company (Nigeria) Limited and Habitat and Building Concepts Limited should embrace Modern Procurement Practices: Construction firms should consider transitioning from traditional procurement methods to more efficient and streamlined approaches, such as electronic procurement systems and supplier partnerships. This can help reduce procurement delays and ensure a steady supply of materials.
- II. Implement Just-In-Time (JIT) Principles: Adopt JIT principles in materials management to minimize inventory levels, reduce storage costs, and improve the synchronization of materials with project needs. Carefully plan material deliveries to align with project schedules.
- III. Leverage Technology: Invest in modern materials management software and information systems to enhance inventory control, demand forecasting, and tracking of materials. These technologies can improve accuracy and decision-making.
- IV. Optimize Transportation and Logistics: Develop comprehensive transportation and logistics strategies that account for Nigeria's infrastructure challenges. Collaborate with logistics partners to overcome transportation bottlenecks and minimize project delays and Enhance Supplier Relationships: Foster strong relationships with suppliers to ensure timely deliveries and reliable access to quality materials. Establish clear communication channels and negotiate favourable terms to reduce procurement lead times.

References:

- Afolabi, A., Ibem, E., Aduwo, E., Tunji-Olayeni, P., & Oluwunmi, O. (2019). Critical success factors (CSFs) for e-Procurement adoption in the Nigerian construction industry. *Buildings*, 9(2), 47. <https://doi.org/10.3390/buildings9020047>
- Agapiou, A., Clausen, L. E., Flanagan, R., Norman, G., & Notman, D. (2018). The role of logistics in materials flow control. *Construction Management and Economics*, 16(2), 131-137. <https://doi.org/10.1080/014461998372420>
- Akinola, G. O., Oyewole, Y. B., Olaleye, B. R., & Ibrahim, A. (2022). The influence of material management practices on financial performance of manufacturing firms in Southwestern Nigeria. *Fuoye Journal of Accounting and Management*, 5(2), 264-280.
- Andawei, M. M., Enenimiet, A. K. A., & Openebo, O. B. (2017). Project planning in the construction industry: A study of selected projects in River State, Nigeria. *The Quarterly Survey*, 53(3), 9-16. <https://doi.org/10.3390/buildings14030807>
- Bon-Gang, H. (2019). Performance and improvement of green construction projects: Management strategies and innovations. <https://doi.org/10.1016/B978-0-12-815483-0.00002-8>
- Canter, M. R. (2013). *Resource management for construction: An integrated approach*. Macmillan.
- Egwuatu, E. I. (2022). Material management and organizational productivity in plastic manufacturing companies in Anambra State, Nigeria. *International Journal of Innovative Social Sciences & Humanities Research*, 10(4), 74-90.
- Essel, R. E. (2021). Assessing materials management practices effect on firm's performance in Ghana Using Dominance Analysis: Evidence from a Listed Company. *Journal of Operations and Strategic Planning*, 4(2), 194-201.
- Jahani, N., Sepehri, A., Vandchali, H. R., & Tirkolae, E. B. (2021). Application of industry 4.0 in the procurement processes of supply chains: A systematic literature review. *Sustainability*, 13(14), 7520.
- Malhotra, N. K. (2011). *Pesquisa de marketing: uma orientação aplicada* (3rd ed.). Porto Alegre, RS: Bookman.
- Nowicka-Skowron, M., Edyta Kaczyńska, M., & Dobrovsky, L. (2007). Road transport management and innovations. *Zeszyty Naukowe Politechniki Częstochowskiej Zarządzanie Nr 35*, 97-107. <https://doi.org/10.17512/znpcz.2019.3.08>
- Nwachukwu, C. C., & Emoh, F. I. (2010). A systems approach in analyzing material constraining actors to construction project management success in Nigeria. *Interdisciplinary Journal of Contemporary Research in Business*, 2(5), 90-105. <https://doi.org/10.1515/mper-2017-0039>
- Obiegbu, M. E. (2019). Materials management on building site. *Journal of Building Technology and Management-Professional Journal of NIOB*, 1, 33-45. New York: John Wiley & Son Inc.
- Ogunlana, S. O., Promkuntong, K., & Jearkjinn, V. (1996). Construction delays in a fast-growing economy: Comparing Thailand with other economies. *International Journal of Project Management*, 14(1), 37-45. [http://dx.doi.org/10.1016/0263-7863\(95\)00052-6](http://dx.doi.org/10.1016/0263-7863(95)00052-6)
- Patil, A. R., & Pataskar, S. V. (2013). Analyzing material management techniques on construction projects. *International Journal of Engineering and Innovative Technology (IJEIT)*, 3(4), 96-100.
- Pheng, L. S., & Chum, C. J. (2011). Just-in-time management in precast concrete construction: A survey of the readiness of main contractors in Singapore. *Integrated Manufacturing Systems*, 12(6), 416-429. <https://doi.org/10.1108/EUM0000000006107>
- Rey-Ares, L., Fernández-López, S., & Rodeiro-Pazos, D. (2021). Impact of material management on profitability for Italy fish canning companies. *Marine Policy*, 13(5), 104-113.
- Schiele, H. (2019). Purchasing and supply management. In H. Schiele (Ed.), *Operations, logistics and supply chain management* (pp. 45-73). Springer, Cham.
- Sila, J., & Gakobo, J. (2021). The effect of materials management and project performance construction companies in Nairobi City County, Kenya. *International Academic Journal of Information Science and Project Management*, 3(6), 368-391. <http://ir-library.ku.ac.ke/handle/123456789/22332>
- Stukhart, G. (2015). *Construction materials management*. Marcel Dekker Inc.; New York.
- Tanveer, M. I., Zafar, S. A., & Shahid, U. H. (2022). The impact of material management on the performance of textile manufacturing firms in Pakistan. *African Journal of Emerging Issues*, 4(9), 1-11.
- Varghese, K., & O'Connor, J. T. (2015). Routing large vehicles on industrial construction sites. *Journal of Construction Engineering and Management*, 121(1), 1-12. <https://doi.org/10.36680/j.itcon.2022.040>
- Wayrah, M. Y., Sarpin, N. B., Mohamed, S., & Masrom, M. A. N. (2021). The impact of materials management on construction project delivery in Somalia. *Journal of Technology Management and Business*, 8(1), 57-72. <https://doi.org/10.30880/jtmb.2021.08.01.008>

Yadhun, M. K., & Shrinath, R. K. (2022). A study on the qualitative analysis of materials management in Kerala construction industry. *International Research Journal of Engineering and Technology*, 9(12), 15-22.

Ugochi Sandra Uzoho
Nile University of Nigeria
Abuja
Nigeria
sandrauzoho@gmail.com

Frank Alaba Ogedengbe
Nile University of Nigeria
Abuja
Nigeria
frank.ogedengbe@nileuniversity.edu.ng
ORCID 0000-0001-8896-7352

Francis Sylvanus Udoh
Nile University of Nigeria
Abuja
Nigeria
francis.udoh@nileuniversity.edu.ng
