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BUILDING MATERIALS SUPPLY CHAINS MANAGEMENT AND THE PERFORMANCE OF HOUSING SECTOR IN THE FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA

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Abstract

The main objective of this study is to examine the impact of building materials supply chains management on the performance of housing sector in the Federal Capital Territory (FCT), Abuja, Nigeria. The study investigated the extent to which poor Supply Chains Management and other problems associated with the flow of building materials management affects the performance of the housing sector. The study is a survey research design where both primary and secondary sources of data were used with a population of 66,883 respondents and a sample size of 398 drawn from building occupiers/owners, contractors and marketers cutting across the 7 Area Councils in the FCT. The data were analyzed using Descriptive Statistics, Inferential Statistics and Regression Analysis. The findings revealed that supply chains management of building materials negatively impact on the performance of the housing sector in the FCT. The study found out supply of substandard building materials, overestimation of cost of building materials and variation/fluctuation in the cost of materials as the variables with the most significant impact while wastage of some materials in the course of transportation to site

due to poor management of distribution logistics, materials shortages during construction work and sudden alteration of prices of materials and stringent government conditions on building laws as the variables with the least impact culminating into sharp practices which result in ugly vices such as building collapse, hike in tenancy rate and indiscriminate proliferation of buildings without compliance with safety standard. The study recommends the need for effective supervision of building projects by managers, development control and other stakeholders to ensure quality control and standardization for effective performance of the sector. The study concludes that effective management of building supply chains processes is a prerequisite for a decent accommodation free of building associated problems which will enhance well-being of the citizens for improved standard of living of members of the society.
Keywords: Building Materials, Housing Sector, Performance, Supply Chains Management

INTRODUCTION

Background to the Study

Housing is one of the basic needs of human life which has long been identified in the theory of the hierarchy of needs as man's desire for shelter after food has been taken care of (Abraham Maslow, 1943). In the past, many people seek for shelter in a bid to carry out their daily economic and social activities and also to ensure that their family is safe and comfortable inside the building they occupy (safety needs, in Maslow's five Hierarchies of needs).

Today, there is no doubt that the nature of materials used in building the houses that Nigerians dwell in, goes in a long way to determine the condition of living for most families and as well for individuals' wellbeing. Some individuals by their nature do not care about the physical and aesthetic condition of the house they occupy because of the believe that it is the role of government and professionals like building engineers and architects to inspect and evaluate the status of a residential building continuously. But this is rarely done. In the FCT for example, less attention has been given to the assessment of building projects standardization and performance as one of the basic need of human life for overall existence. The lack of affordable housing in the Federal Capital Territory continues to remain unsolved with the very high cost of housing that are available but not affordable thereby denying low-income earners to having a decent accommodation for an improved standard of living for quality life.

Quite a large number of people in Abuja reside in satellite towns where the absence of basic amenities such as potable drinking water, constant electricity and hygienic-sanitary facilities including waste management is not an uncommon sight in these areas. There is clear evidence in generic literature on the theory of motivation which shows that affordable housing

benefits low-income families and these enable the government to invest in the public housing scheme.

Logistics issues such as the price of materials appear in supply chain literature as one example of the known disruption along the supply chain. Therefore, to reduce the effects of this problem on housing projects, proper management of logistics is the dominating criterion for supplier selection. Due to inadequate local manufacturers of building materials such as aluminum roofing sheets, iron rods and grabbles within the FCT. Existing suppliers have no option than to efficiently plan and effectively manage the supply chain logistics particularly that of the transportation cost linked to the sourcing and supply of these materials that are not readily available in the markets resulting in hike in prices of such goods.

In Abuja the Federal Capital Territory, building materials like cement has not only results to the hike in prices of building materials but also delays in the materials delivery to the site which is a common feature associated with the supply chains process of building materials in the FCT. This is a problem capable of having adverse effects on the performance of building projects not only in the FCT but the entire Nigeria's housing sector as its results to building collapses, damage/loss to properties and death in some instances. It is in view of this that the researchers have greater interest in investigating the impact of building material supply chains management on the performance of housing sector in the FCT. The study will help in identifying the actual supply chain factors that are more likely to affects the quality of houses occupied by residents in the Federal Capital Territory (FCT), Abuja. Even though similar studies were conducted by other researchers (such as those of Oludami, 2002 & Moneke & Echeme, 2016), their studies focuses on building materials specification and enforcement on site and assessment of the supply chain management process in the Nigeria's construction industry, respectively as they did not focus on the impact of building materials supply chain management on the performance of the housing sector in the FCT, Abuja which this study is designed to accomplish.

Statement of the Problem

Building materials supply chains for housing is often characterized by short-time delivery expectations along the supply chains. This short time expectation needs to be met by suppliers, contractors, sub-contractors, and builders, regardless of incomplete information and insufficient budgets which affects purchasing function and quality of material selection decisions. A common problem associated with materials supply chains is inefficiently supplied chain management, overestimation of costs and quantities of materials, supply of substandard building materials which lead to building collapse and uncertainties brought about by the

environmental factors such as inflation rate, exchange rate, prices and demand situation in the country. This study investigated the problems and came up with some policy recommendations towards addressing them.

Research Questions

In view of the above problems, the following research questions were raised:

1. To what extent insufficient supply chain management practices impact on the performance of the housing sector in FCT, Abuja?
2. How do the over-estimation of the cost of building materials affect the performance of the housing sector in the FCT, Abuja?
3. To what extent supply of substandard building materials affect the performance of the housing sector in the FCT, Abuja?
4. What is the extent of the impact of environmental uncertainty on the performance of the housing sector in the FCT, Abuja?

Objectives of the Study

The main objective of this study is to assess the impact of building materials supply chain management on the performance of the housing sector in the Federal Capital Territory, Abuja. The specific objectives are to:

1. Determine the impact of insufficient supply chain management practices on the performance of the housing sector within the FCT, Abuja.
2. Assess how over-estimation of the cost of building materials affect the performance of the housing sector in the FCT, Abuja.
3. Examine the extent to which supply of substandard building materials affect the performance of the housing sector in the FCT, Abuja.
4. Determine the extent to which environmental uncertainty impact on the performance of the housing sector in the FCT, Abuja.

Statement of Hypotheses

The following hypotheses were formulated and tested in the course of the study:

H_{01}: Insufficient supply chain management practices have no significant impact on the performance of the housing sector in FCT.

H_{02}: Overestimation of building materials has no significant impact on the performance of housing in FCT, Abuja.

H_{03}: supply of substandard building materials has no significant impact on the performance of the housing sector in FCT

H_{04}: environmental uncertainty has no significant impact on the performance of the housing sector in FCT

Scope and Limitations of the Study

The study is restricted to the impact of building materials supply chains management on the performance of the housing sector in the Federal Capital Territory, Abuja. The study focused on supply chains management practices issues such as overestimation of costs and quantities of materials, supply of substandard building materials and uncertainties brought about by the environmental factors such as inflation rate, exchange rate, prices and demand which is affecting the sector in the FCT. Issues associated with standard building materials and performance measurement indices of the sector in the major satellite towns in the four Area Councils namely; Abuja Municipal Area Council (AMAC), Bwari, Gwagwalada and Kuje Area Councils were focused on. The choice for these areas was in view of the fact that over 80 percent of the buildings in FCT are located in the four local government areas (Abuja Development Control, 2018). The period of study is four (4) years from 2016-2019. The period is chosen because of the massive construction work executed by building developers, government agencies and corporate bodies trying to promote Public Private Partnership (PPP) in the sector. As part of the constraints of the study, the researchers did not investigate the situation in the entire six Area Councils making up the FCT as only four Area Councils were studied and thus, could not draw generalization to mean FCT even though the larger percentage of the FCT was adequately covered.

LITERATURE REVIEW

Concept of Supply Chains Management

Supply chain management (SCM) is responsible for the movement of materials from initial suppliers through to final customers. The effective supply of building materials to respond to customers order requirements for housing projects in a specific geographical location is affected by distance travel to meet demand as well as supply chain management decisions made by the supplier. Due to materials delivery challenges faced by many manufacturers along the distribution channels of their product supply chain, the concept of SCM started in the manufacturing industry in Japan. The goals of SCM are to reduce uncertainty and risks in the supply chain, thereby positively affecting the inventory levels, cycle time, processes and ultimately, end-customers service levels (Guiffrida and Nagi, 2006). Building material delivery

challenge is just one among existing supply chain risk which some suppliers perceived as a controllable event that might affect material movement and disrupt the planned flow of materials.

Mensah, Diyuo and Oppong (2014) defined it as a set of activities undertaken in an organization to promote effective management of its supply chain. Supply chain management is a network of different organizations, linked upstream and downstream in a chain, aiming to make available products for the end users through integrated process and activities. From the definition, it can be deduced that components of SCM practices include supply and material management issues, operations, information sharing, and customer service. Supply chain management is defined by Mentzer (2001) as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.

The first stage in supply chain management is known as Plan. A plan or strategy must be developed to address how a given good or service will meet the needs of the customers. A significant portion of the strategy should focus on planning a profitable supply chain. Khyomesh (2011) cited in Bamidele and Festus (2016) study revealed that the most commonly used basis for material planning activities for every building project is the Bill of Quantity prepared by the client. Bill of quantity as a decision tool for effective material planning underscores the relevance of proper planning to reduce uncertainties which are inextricably linked to quantities requirements and quality of materials specifications to be sourced and purchased by contractors who execute the work for his/her client. Although, the client owns the building project, yet material ordering must be adequately managed to prevent cost overrun.

Secondly, developing the supply chain is the next stage in supply chain management. It involves building a strong relationship with the suppliers of the raw materials needed in making the product the company delivers. This phase involves not only identifying reliable suppliers but also planning methods for shipping, delivery, and payment. More importantly, at the third stage, this is to make the product (building materials) and get the finished product ready for purchasing and supply and scheduled for delivery. Then, in the logistics phase, customer orders are received and delivery of the goods is planned. The fourth stage of the supply chain management stage is aptly named Deliver. The final stage of supply chain management is called Return. As the name suggests, during this stage, customers may return defective products; while the material suppliers will also address customer questions regarding non-conformance with order specifications at this stage (Bamidele & Festus, 2016).

Supply Chains Management Practices

The five SCM practices are the most frequently used practices such as supplier integration, internal integration, customer integration, information sharing, and postponement as discussed below:

Supplier Integration

Supplier integration is defined as “the long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits” (Li, Ragu-Nathan, Ragu-Nathan & Subba Rao, 2004). Supplier integration characterized by various aspects and activities such as information sharing, coordination, trust, shared technology, integrated processes, long-term contracts, assisting suppliers to improve production processes, fostering quality improvements, investing in supplier’s assets, including suppliers in new product development, improving supplier’s overall capabilities, risk and reward sharing, and shared gains.

Internal Integration

Internal integration is defined as "the degree to which a manufacturer structures its organizational strategies, practices, and processes into collaborative, synchronized processes, to fulfill its customers' requirements and efficiently interact with its suppliers” (Flynn, Huo & Zhao, 2010).

Customer Integration

Customer integration is defined as “demand management practices through long-term customer relationship, satisfaction improvement, and complaint management” (Tan, Kannan & Handfield, 1998). The fundamental aspect of customer relationships is the focus on key customers to understand their needs and requirements and to satisfy them (Sheth et al., 2000). Customer integration includes different activities and practices such as integrated problem-solving initiatives, direct customer contacts, managing customer complaints, increasing customer satisfaction, and establishing long-range relations with customers (Sousa, 2003; Boulding, Staelin, Ehret & Johnston, 2005).

Information Sharing

Information sharing is defined as "The extent to which critical and proprietary information is communicated to one's supply chain partner" (Li et al., 2004). The advancements of

information technology have greatly contributed to the evolution of sharing information throughout SC. Regular exchanges of information enable SC parties to perform as a single body (Stein & Sweat, 1998). Shared information has different kinds related to inventory, resources, products, demands, delays, and planning information (Sakka & Botta-Genoulaz, 2009). It may also include information about quality, logistics, customer and general market information, and design information (Singh, 2013). To yield the best results, shared information has to be adequate, accurate, credible, and timely (Li et al., 2004). Information sharing affects performance in terms of improved customer responsiveness, decreased costs, enhanced service levels, and reduced levels of complexity (Zhao, Xie & Zhang, 2002).

Postponement

Postponement is defined as "the practice of moving forward as far as possible one or more operations or activities to a later point in the supply chain" (Van Hoek, Vos & Commandeur, 1999). The postponement will be the appropriate SC strategy in the following situations: costly and expensive products, short product life cycles, long delivery time, high demand variance, a high degree of customization, innovative products, high variety of products with low volume, and low delivery shipments (Van Hoek, 2001). Postponement brings several benefits to companies. It enables companies to control the risks related to product diversity and uncertain demand, increases flexibility, enables companies to keep their options open before the availability of sufficient information, reduces SC costs by keeping undifferentiated inventories, reduces levels of inventory, improves forecasting effectiveness, facilitates mass customization, and reduces production cycle times (Yang, Burns & Backhouse, 2005; Li et al., 2004).

Cost Estimation of Materials

The cost estimate aims to predict the magnitude of the costs incurred to implement an activity in the future. Conceptual cost estimation is one of the most critical tasks in the early stages in the life cycle of a building project (Trost et al., 2003). The cost estimate is a prediction of quantities, cost, or price of resources required by the scope of an asset investment option, activity, or project. As a prediction, an estimate must address risks and uncertainties (AACE, 2007). All construction projects, regardless of type and size, involve many significant uncertainties and risks through all their construction phases, from the start-up to the completion of the project. Ahuja (1994) said that the types of estimation for the various phases of activities in construction projects can be divided into several groups as follows: Order of Magnitude, Budget Estimates**,** Detailed Estimates, Direct Costs which is sub-divided as Cost of materials**,**

Cost of Equipment (Soeharto, 1999) divided into: Cost of procurement, Cost of operations, Cost of labour, Cost of subcontractors (Break into: Indirect costs, Overhead cost**s**, and Contingencies Costs**.**

Supply of Substandard Building Materials

In Nigeria, materials and components are displayed in the market without the Standard Organisation of Nigeria (SON) quality certification number. It is also noted that quality continues to decline (Akingboungbe, 2002). Moreover, Odulami (2002) stated that there are insufficient testing laboratories where most building materials and components are tested before the standard established for good practice and use. Sometimes, specimens of materials sent to the laboratories have better strength than those on production sites. In 1998, a building collapsed in Abuja during construction attributed to the use of substandard materials especially the concrete block used in the construction. Quality of concrete, for instance, has been badly affected due to sub-standard and poor material. This is the reason why many buildings of reinforced concrete members collapsed with the loss of lives and injuries (Olusola, Ata & Ayangade, 2002).

Environmental Uncertainty

Environmental uncertainty refers to uncertain changes occurring externally and the degree of instability in the business environment that may occur at any point within a global supply chain network and might result in an inability of an organization to understand, estimate, make sense of how an environment might change, the potential impact of the changes, and whether an organization's response to such changes might be successful or not. Dynamic environments may be characterized by changes in technologies, variations in customer preferences, and fluctuations in product demand and/or the supply of materials. Such unexpected changes require that firms develop the capability to understand and adapt to environmental changes. This is because these forces have a large impact on a firm’s competitiveness and shape their structures and operating procedures. Uncertainty in the supply chain can take many forms, e.g. uncertainty regarding the liability of suppliers, the actions of competitors, or the quality of products (Stevenson & Spring, 2007).

Performance Measurement in the Housing Sector

Yang (2005) posits that performance measurement in the context of residential housings scheme centers on three different levels namely; project, company and stakeholders' levels. He states further that, the perspectives of performance measurement has expanded beyond project performance measurement which focuses on cost, time and quality to company performance

measurement which is usually evaluated using traditional accounting system. Though traditional accounting systems have been criticized and considered inappropriate, short term, lag indicators, static metrics, and backward-looking measures, as well as reactive, descriptive and lagging indicators in assessing organizations' performance. Consequent to the criticism, the soft measures of performance that focus on non-financial performance are being considered (Kaplan & Norton, 2001).

Theoretical Framework and Basis for the Study

Theory of Adverse Selection of Supply Chains Decision

Fisher (1997) proposed a theory of adverse selection along the supply chain for products, following questions raised by him, what is the right supply chain for your product? Fisher in his view submitted a proposition suggesting that the first step before devising an effective supply chain strategy is to consider the nature of the demand for the products that one's company supplies. Fisher emphasizes a specific aspect of variability in demand to classify generic products into two distinct dimensions of functional or innovative product type. Functional products according to Fisher theory he tagged as predictable demand and wide variety (brands), with the possibility of profit margins eroding due to high competition in the market place (Fisher, 1997). On the other hand, innovative products have an attribute of short life-cycle, the unpredictability of demand inclusive of high-profit margin tendencies.

This present study was aimed at assessing housing sector performance with connections to building materials supply chains management. As a result, this differential/partial or incremental cost can be related to the aggregate cost functions in terms of physical cost and market mediation cost function echoed by Fisher in his supply chain model. Physical costs by description are the costs of building material production, transportation, and inventory storage. While marketing mediation costs arise when supply exceeds the demand and a product has to be marked down to be sold at a loss (Fisher, 1997). The available supply of building materials in quantity does not seem to outweigh the current demand for sharp sand, shipping, corrugated roofing sheet, PVC pipes, and ceiling board and cement demand in Abuja FCT, Nigeria. And so the local market prices of building materials are not likely to be marked down because product innovation is rear to find in the suppliers market for building materials.

Theory of Post Occupancy Evaluation (POE)

Post occupancy evaluation (POE) theory is a relevant and general term for a broad range of activities aimed at understanding how buildings perform once they are built. POE is an appraisal framework and has been used as an integral component of the building

performance procurement and supply chain process. POE was derived from the "occupancy permit", a document that is issued once the building has been inspected and is declared free from all defects and ready for occupation. POE refers to the evaluation of the performance of buildings after occupation with the sole objective of understanding the interaction between the property and occupants so that improvement is made (Nawawi & Khalil, 2008). The theory reveals that if POE is not conducted for already existing buildings, chances are that the mistakes on a particular type of building may be repeated without prior knowledge of what needs to be improved. According to Ishiyaku, Kasim, Harir and Sabo (2016) there have been strong reasons for POE studies, as the evaluation method assesses attributes of building to measure their performance based on occupants' satisfaction, perception or experience and justify the need for improvement since the goal of SCM is to satisfy end-customers service levels (Guiffrida & Nagi, 2006). Despite the researcher's effort in building performance evaluation, especially post-occupancy evaluation, very little is known about the individual effects of the tangible (physical) building features such as types of walls, floors and ceilings types used in the housing sector (Ishiyaku et al., 2016). In Nigeria, existing studies (Ukoha & Beamish, 1997; Olatubara & Fatoye, 2007; Fatoye & Odusami, 2009; Ilesanmi, 2010; Clement & Kayode, 2012) focus on the general performance of housing sector in meeting occupants' needs and expectations. From these studies, it is established that the physical characteristics of residential buildings have a significant influence on occupants' satisfaction with their residential environment. This implies that the dwelling unit component of housing plays a vital role in determining the quality of the residential environment in particular and the performance of housing projects in general.

Empirical Literature on the Impact of SCM on Performance

Moneke and Echeme (2016) examined supply Chain Management (SCM) in effective project delivery in the Nigerian Construction Industry in Imo State. They focused on identifying the challenges of construction supply chain management (CSCM) for effective project delivery in Imo state and also identified the CSCM practice in curtailing the challenges in the construction industry in Imo state. A survey questionnaire was distributed to ninety-five (95) construction stakeholders in Imo state both in the private and public sectors of the construction industry. Sixty (60) were successfully retrieved and analyzed using statistical package for social sciences. Average mean scores (AMS) and relative important index (RII) was used for analyzing the raw data obtained from the field. The findings revealed that inadequate investment in information technology (I.T), ineffective

communication and diverse objective were ranked highest whereas unfair risk allocation and poor understanding of SCM were ranked lowest among the challenges facing the construction industry. More so, the relative important index ranges from 0.82 for a trust-based relationship, information flow, and strong financial flow respectively (being the first on the list) to 0.69 for Human Resource supply chain which is the least on the list involving common construction supply chain management practices in curtailing challenges in the construction industry.

Lilian and Allan (2017) studied the influence of supply chain management practices on competitive advantage in the cement manufacturing industry, with a focus on East African Portland Cement Company Limited. The study specifically sought to examine the effect of strategic supplier partnership and customer relationship on the competitive advantage of cement manufacturing firms in Kenya. The study adopted a descriptive research design. The target population was 676 staff from three departments, namely, supply chain department, sales & marketing and production department in EAPCC. The sample size for the study was determined using Yemane's formula (2007). The study collected primary data using questionnaires. Statistical Package for Social Sciences (SPSS) version 21 was used in the data analysis. The study found that strategic supplier partnership influenced competitive advantage in the cement manufacturing industry. Strategic supplier partnership enhanced joint inventory management between the organization and the supplier and helped promote shared benefits and ongoing collaboration in key strategic areas like technology, products, and market, the strategic partnership promotes collaboration in the design of the product. Customer relationship influenced the competitive advantage at EAPCC. Close relationships with customers enabled the organizations' customers to distinguish its products to competitors.

Asgarnezhad (2018) evaluated the impact of supply chain capabilities on the operational and financial performance of food companies. The study population consists of 76 companies operating in the food industry in Ardabil is one of the metropolises of Iran. Given the limited number of population, no sampling method was used and all companies went under scrutiny. A standard questionnaire was used as the data collection tool which was given to the managers of the companies. To test the research hypotheses, structural equation modeling and PLS software were used. The results of hypotheses testing suggested a significant positive impact of supply chain capabilities on the operational and financial performance of food companies. Additionally, the positive impact of operational performance on the financial performance of the companies was confirmed. Finally, it was found that operational performance has a mediating

role in the relationship between supply chain capabilities and the financial performance of the companies.

Popoola (2019), examine the supply-chains-management factors that could enhance the organization's performance in manufacturing companies. To achieve the objectives of this current study, a quantitative approach was used in the research. The data for the study was gathered using a self-administered (face-to-face) method which is in line with many researchers. The population of the study comprises of the employees in manufacturing firms in Nigeria. Four hundred (400) questionnaires were distributed to the participants to get the required sample size.

METHODOLOGY

Research Design

The study employed a descriptive survey design. Descriptive design was used because this study sought to describe and establish relationships between materials supply chain factors and performance of the housing sector in FCT. This study is primarily a qualitative research design utilizing data collected from building occupiers/property owners, Suppliers of Building Materials, Registered Building Engineers and development control officers as major respondents to provide data for this survey.

Population of the Study

The study population consists of 65,480 housing units in the FCT. In specific terms, new housing units, and existing buildings occupied by the household for shelter purposes represent the characteristic of the study population. The population also consists of Registered Building Engineers with COREN, FCT Development Control Department as well as Suppliers of Building Materials (Table 1).

Table 1: Target Population of the Study

S/N	Category of Respondents	Population
1	Building Occupiers	65,480
2	Suppliers of Building Materials	118
3.	Registered Building Engineers	1245
4.	Development Control Officers	40
	Total	66,883

Sources: Survey Data (AGIS Report 2017, COREN, Abuja Branch)

Sample Size and Sampling Techniques

The sample size of this study was determined using the Taro-Yamane sampling framework, with a maximum desire sampling error of 95% confidence level. The Taro Yamane formula for a finite population was given as:

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

Where:

n = sample size for expected participant in study area of Abuja

N = the size of the respondent population

e = the level of significance (or limit of tolerable error = 0.05)

1 = unity (a constant)

e = 0.05

$n = 66883/1+66883(0.05)^2$

n =66883/1+66883(0.0025)

n = 66883/1+167.2075

n = 66883/168.2075

n = 398

The sample size of the study is 398 which were used for analysis. The questionnaires were administered to contractors, builders, suppliers, and marketers of building materials in the FCT, Abuja. The study adopts simple random sampling technique, stratified sampling techniques as well as convenient sampling for the selection of actual respondents. The simple random sampling technique was adopted because it gives each member of the population an equal chance of being selected while the stratified sampling was employed because the different categories of respondents are spread across the FCT. However, convenient sampling was adopted for the selection of respondents under the development control department because the respondents are readily accessible (Kothari, 2011).

Sources of Data

Both primary and secondary sources of data were employed for the study that was conducted in four selected areas in the FCT, Abuja including Gwagwalada, Abuja Municipal, Bwari, and Kuje areas councils. The reason for selecting these area councils was that it has over 80 percent more houses and infrastructure development than Abaji and Kwali Area Councils in FCT, Abuja (Abuja Development Control, 2018). The primary source consists of the administration of questionnaires to elicit information from the

respondents of this study. The secondary sourced consists of extant literature sourced from online books, academic journal articles and unpublished research materials that are relevant to the study. These types of secondary data were collected for reviewing the extant literature relating to building performance evaluation and material supply chain management issues under investigation.

Methods of Data Collection

Primary data were collected using a structured questionnaire. Four types of questionnaires instruments were designed and used in this study. The first questionnaire was designed to collect responses relating to building material supply chain management issues from building occupiers/owners. The second questionnaire gathers data from registered engineers. The third and fourth set of the questionnaires were designed to elicit information from suppliers of building materials and development control officers. Each of the set of the questionnaire is structured into two section – section A which focuses on the information in line with the research questions and section B which focuses on the demographic characteristic of the respondents. To increase the response rate in this study, the researchers employed the services of four research assistants who assisted in the administration of the questionnaires.

Study Variables and Measurement

The independent variable is supply chain management while the dependent variable is performance of the housing sector in FCT, Abuja. The study variables are insufficient to supply chain management, building materials management, problems associated with building material management. Each of the study variables has 5 items measuring them. Items on poor supply chain management were adopted and modified from the work of Bamidele and Festus (2016). Lastly, items measuring the performance of housing sectors were adopted from the study of Beatham, (2003) and Bassioni, (2004). The model is stated as follows:

$Pf = \alpha + \beta_1 PSCMP + \mu$ ……...1

$Pf = \alpha + \beta_1 OEBM + \mu$ …….2

$Pf = \alpha + \beta_1 SSBM + \mu$ ……. 3

$Pf = \alpha + \beta_1 EU + \mu$ ……. 3

Where,

PSCMP = Poor Supply Chains Management Practices

PF = performance of the housing sector in FCT.

OEBM = Over estimation of building materials

SSBM = supply of substandard building materials

EU = environmental uncertainty

α = constant

μ = error term

Validity and Reliability of Research Instruments

Content validity was used to validate the structured questionnaire instrument by administering 33 percent of the questionnaires to experts in the field of supply chains and project management issues. Further, data was subjected to Reliability Statistics using SPSS 20. All the items measured, indicated high reliability of 0.7 which is above the minimum cut-off thumb mark.

Table 2: Reliability Statistics

S/n	Constructs/Items	Cronbach's Alpha Based on Standardized items	No. of Items
1	Poor Supply Chain Management practices (SCMP)	0.714	3
2	Overestimation of building materials	0.762	3
3	supply of substandard building materials	0.830	3
4	Performance of Housing Sector	0.718	3
5	Environmental uncertainty	0.792	3
Total			**15**

Table 2 shows that the constructs/items are internally consistent with each other if there Cronbach's alpha value is equal to or more than 0.70. From the table, all the Cronbach's alpha values of the items exceed 0.70. This indicates the degree of internal consistency among the variables or scales used to measure the impact of Building Supply Chain Management on the Performance of Housing Sector in FCT. The closer the Cronbach's Coefficient Alpha is to 1, the greater the internal consistency of the items in the scale. If no correlation exists, Cronbach's Coefficient Alpha is zero it implies that the sub-indices or question items are independent. A high Cronbach's alpha coefficient is an indication that the underlying items reflect the desired variable well (Nunnally & Berstein, 1994).

RESULTS AND DISCUSSION

Response Rate

Table 3: Response Rate

S/N	Respondents	Location (Area Councils)	No. of Questionnaires Administered	No. of Questionnaires Returned	Percentage (%)
1	Contractors, Construction Workers/Builders, Marketers of Building Materials, Suppliers, Housing Owners & Other Stakeholders	Gwagwalada	99	87	27.53
2		AMAC	101	81	25.63
3		Bwari	99	76	24.05
4		Kuje	99	72	22.78
Total			**398**	**316**	**100**

A total of 398 questionnaires were administered out of which 316 were returned which are used for the analysis in the study. The response rate is presented in a tabular form as can be seen in Table 3. The table shows that out of the three hundred and ninety eight (398) total numbers of questionnaires that were administered for the study, three hundred and sixteen (316) constituting 79.39% response rates were collected. Out of these, 87 of them representing 27.53% were contractors, construction workers/builders and marketers of building materials, suppliers and housing owners and other stakeholders who responded from Gwagwalada Area Council, while 81 or 25.63%, 76 or 24.05% and 72 or 22.78% responded from AMAC, Bwari and Kuje Area Councils, respectively. The breakdown further shows that just like Gwagwalada Area Council, most of the respondents in AMAC, Bwari and Kuje are respondents who are mostly contractors, construction workers/builders and marketers of building materials, suppliers and housing owners and other stakeholders. The significance of the result above is that the quality of the expected responses is to a considerable extent dependable, since majority of the respondents are very familiar with the area of the study.

Respondents Characteristics

Table 4 shows the distribution of respondents according to their sex. 219 of the respondents representing 69.30% are males while, 97 representing 30.70% of the respondents are females. The implication of this finding to the study is that majority of the respondents are males with the physical stability involved in major construction works across the Area Councils in the Federal Capital territory. The table shows the educational levels of the respondents to be 87 or 27.53% as OND/NCE/Diploma holders, 91 or 28.79% are B. Sc. /HND certificates holders

that responded. Furthermore, the table shows that 61 or 21.52 are MBA/MSC / PGD holders while, 70 or 22.15% of the respondents did not specify the level of their education. The respondents' years of working experience indicates that 123 or 38.92% of the respondents of working experience of between less than one to two years and those years of working experience of between 3-10 years who constituted 102 respondents representing 32.28% while 91 or 28.79% respondents possessed 11 years of working experience and above. The finding implies that the respondents are competent enough with the requisite qualification and experience to make any meaningful contribution on the subject matter.

Table 4: Demography Characteristics of Respondents

Sex	**Frequency**	**Percentage**
Male	219	69.30
Female	97	30.70
Total	**316**	**100**
Educational Qualification	**Frequency**	**Percentage**
OND/NCE/Diploma	87	27.53
B.Sc / HND	91	28.79
MBA / MSC / PGD	68	21.52
Other not specify	70	22.15
Total	**316**	**100**
Working experience	**Frequency**	**Percentage**
0 – 2 years	123	38.92
3 – 10 years	102	32.28
11 years and above	91	28.79
Total	**316**	**100**

Descriptive Statistics

Table 5: Descriptive Statistics on the variables

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
PSCMP	316	1.10	4.80	3.8678	.97073
OEBM	316	1.40	4.90	3.8542	.78582
SSPM	316	1.30	4.10	3.9934	.83729
EU	316	1.20	4.60	3.9380	.93354
PF	316	1.19	4.10	3.78122	.898280
Valid N (listwise)	316				

Table 5 shows that the result of the descriptive statistics which indicated the mean and standard deviation as well as the minimum and maximum value of the variables. The mean

value of poor supply chain management practices (PSCMP) is 3.86, the supply of substandard building materials (SSPM) is 3.85, the mean Overestimation of building materials (OEBM) is 3.99 and the mean value of environmental uncertainty (EU) is 2.93. Also, the mean performance of the housing sector in FCT is 3.78. The table also recorded the standard deviation of the variables in the study.

Table 6: Correlation of the Variables

Correlations					
		PF	PSCMP	OEBM	SSPM
PF	Pearson Correlation	1	-.040	.034	.057
	Sig. (2-tailed)		.469	.532	.298
	N	316	316	316	316
PSCMP	Pearson Correlation	-.040	1	-.051	.017
	Sig. (2-tailed)	.469		.350	.760
	N	316	316	316	316
OEBM	Pearson Correlation	.034	-.051	1	-.047
	Sig. (2-tailed)	.532	.350		.389
	N	316	316	316	316
SSPM	Pearson Correlation	.057	.017	-.047	1
	Sig. (2-tailed)	.298	.760	.389	
	N	316	316	316	338

Table 6 indicates that there is a weak positive association between poor supply chain management practices and performance of the housing sector in FCT, Abuja. It also shows a weak positive relationship between overestimation of building materials and the performance of the housing sector in FCT, Abuja. The table also reveals that there is a weak positive relationship between the supply of substandard building materials and performance of the housing sector in FCT, Abuja.

Table 7: Correlations

		PF	EU
PF	Pearson Correlation	1	.015
	Sig. (2-tailed)		.787
	N	316	316
EU	Pearson Correlation	.015	1
	Sig. (2-tailed)	.787	
	N	316	316

Table 7 indicates that there is a very weak association between environmental uncertainty and performance of the housing sector in FCT, Abuja.

Test of Hypotheses

Hypothesis One: Poor supply chain management practices have no significant impact on the performance of the housing sector in FCT.

Table 8: Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.0871[a]	.658	-.521	.11711

a. Predictors: (Constant), PSCMP

ANOVA[a]

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	.065	3	.122	212.8741	.005[b]
	Residual	11.303	313	.125		
	Total	12.368	316			

a. Dependent Variable: PF

b. Predictors: (Constant), PSCMP

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.389	.044		8.756	.000
	PSCMP	-.171	.058	.176	-13.398	.003

a. Dependent Variable: PF

Decision Rule: 5% level of significance

The F-Statistics (F) is 212.8731 with a P statistic value of 0.005 which suggested that the model is a good fit. The coefficient of poor supply chain management practices (PSCMP) is negative and significant in enhancing the performance of the housing sector in FCT, Abuja. The PF= 0.389-0.17 PSCMP indicates that the performance of the housing sector in FCT, Abuja will decrease by 17% for every 1% increase in poor supply chain management practices. The p-value of 0.003 is more than the t-Statistic value of (13.398) and the standard error value of 0.058 is more than the t-statistic value which implies that there is a negative and significant impact of poor supply chain management practices on performance of the housing sector in FCT, Abuja. The coefficient of determination (r^2) of 0.65 indicates that about 65% variation in performance of the housing sector in FCT, Abuja can be explained by the poor supply chain

management practices. The remaining 35% can be explained by other related factors not considered in the regression model.

Hypothesis Two: Overestimation of building materials has no significant impact on the performance of housing in FCT, Abuja.

Table 9: Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.100[a]	.610	.511	.15750

a. Predictors: (Constant), OEBM

ANOVA[a]

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	.083	3	.128	112.119	.001[b]
	Residual	12.2815	313	.125		
	Total	12.118	316			

a. Dependent Variable: PF

b. Predictors: (Constant), OEBM

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.403	.047		8.651	.000
	OEBM	.-055	.054	.056	-1.029	.004

a. Dependent Variable: PF

Decision Rule: 5% level of Significance

The F-Statistics (F) is 112.119 with a P- value of 0.001 which suggested that the model is a good fit. The coefficient of overestimation of building materials (OEBM) is negative and significant in enhancing the performance of housing in FCT, Abuja. The PF= 0.403 -0.05 OEBM indicates that performance will decrease by 5% for every 1% increase in the overestimation of building materials. The p-value of 0.004 is less than the t-Statistic value of 1.029 and the standard error value of 0.054 is less than the t-statistic value which implies that there is a negative and significant impact of overestimation of building materials on the performance of housing in FCT, Abuja. The coefficient of determination (r^2) of 0.61 indicates that about 61% variation in performance of the housing sector in Abuja can be explained by the overestimation of building materials. The remaining 39% can be explained by other related factors not considered in the regression model.

Hypothesis Three: Supply of substandard building materials has no significant impact on the performance of the housing sector in FCT, Abuja.

Table 10: Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.088[a]	.548	.491	.15768
a. Predictors: (Constant), SSBM				

ANOVA[a]						
Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	.064	3	.021	11.864	.000[b]
	Residual	8.304	334	.025		
	Total	8.368	337			
a. Dependent Variable: PF						
b. Predictors: (Constant), SSBM						

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.392	.048		8.212	.000
	SSMB	-.030	.055	.030	-11.547	.005
a. Dependent Variable: PF						

Decision Rule: 5% level of significance

The F-statistics (F) is 11.864 with a P- value of 0.000 which suggested that the model is a good fit. The coefficient of supply of substandard building materials is negative and significant in enhancing the performance of the housing sector in FCT, Abuja. The PF= 0.392-0.30 SSBM which indicates that performance will decrease by 30% for every 1% increase in the performance of the housing sector in FCT, Abuja.

The p-value of 0.005 is less than the t-Statistic value of 0.547 and the standard error value of 0.055 is less than the t-statistic value which implies that there is a negative and significant impact of supply of substandard building materials on the performance of housing sector in FCT, Abuja. The coefficient of determination (r^2) of 0.54 indicates that about 54% variation in performance can be explained by the supply of substandard building materials. The remaining 46% can be explained by other related factors not considered in the regression model.

Hypothesis Four: environmental uncertainty has no significant impact on the performance of the housing sector in FCT, Abuja.

Table 11: Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.085[a]	.457	.342	.15771

a. Predictors: (Constant),EU

ANOVA[a]

Model		Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	.060	3	.120	332.810	.000[b]
	Residual	18.308	313	.125		
	Total	18.168	316			

a. Dependent Variable: PF

b. Predictors: (Constant), EU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.369	.044		8.457	.000
	EU	-.079	.058	.074	-1.353	.000

a. Dependent Variable: PF

Decision Rule: 5% level of significance

The F-statistics (F) is 332.810 with a P-statistic value of 0.000 which suggested that the model is a good fit. The coefficient of environmental uncertainty (EU) is negative and significant in enhancing the performance of the housing sector in FCT, Abuja. The PF= 0.369-0.038 PF which indicates that performance will increase by 38% for every 1% increase in environmental uncertainty. The p-value of 0.000 is less than the t-Statistic value of .642 and the standard error value of 0.059 is less than the t-statistic value which implies that there is a negative and significant impact of environmental uncertainty on performance of housing sector in FCT, Abuja. The coefficient of determination (r^2) of 0.45 indicates that about 45% variation in performance can be explained by environmental uncertainty. The remaining 55% can be explained by other related factors not considered in the regression model.

Discussion of Findings

Since the main objective of the study is to determine the extent to which poor Supply Chains Management impacts the performance of the housing sector in FCT, analysis was

conducted using both descriptive and inferential statistics which reveals that poor supply chain management negatively impacts on the performance of the housing sector in the Federal Capital Territory, Abuja.

The results of the analysis indicate that supply chain management has negative statistically significant in achieving the performance of the housing sector in FCT, Abuja. The study also is in agreement with the finding of Shobayo (2017) who found a statistical negative significant relationship between the variables. Also, the study is inconsistent with the findings of kimmondo *et al* (2017) who found a significant relationship between the variables. The study is also in line with Post-occupancy evaluation (POE) theory which is relevant and general term for a broad range of activities aimed at understanding how buildings perform once they are built. POE is an appraisal framework and has been used as an integral component of the building performance procurement and supply chain process (Duffy, 1998). POE was derived from the "occupancy permit", a document that is issued once the building has been inspected and is declared free from all defects and ready for occupation. POE refers to the evaluation of the performance of buildings after occupation with the sole objective of understanding the interaction between the property and occupants so that improvement is made.

The analysis in hypothesis 1 reveals that there is a negative and significant impact of insufficient supply chain management practices on the performance of the housing sector in FCT, Abuja. This implies that poor supply chain management practices impact negatively on the performance of the housing sector in FCT, Abuja. The study also is in agreement with the finding of Shobayo (2017) who found a statistical negative significant relationship between the variables. The study is in not line with the finding of Mohammed and Mohamed (2017) who found a statistical significant relationship between the variables.

The analysis in hypothesis 2 reveals that there is a negative and significant impact of overestimation of building materials on the performance of housing in FCT, Abuja. This implies that overestimation of building materials impact negatively on the performance of the housing sector in FCT, Abuja. The study also is in agreement with the finding of Shobayo (2017) who found a statistical negative significant relationship between the variables.

The analysis in hypothesis 3 reveals that there is a negative and significant impact of the supply of substandard building materials on the performance of the housing sector in FCT, Abuja. This implies that the supply of substandard building materials impacts negatively on the performance of the housing sector in FCT, Abuja. The study also is in agreement with the finding of Shobayo (2017) who found a statistical negative significant relationship between the variables.

The analysis in hypothesis 4 reveals that there is a negative and significant impact of environmental uncertainty on the performance of the housing sector in FCT, Abuja. This implies that environmental uncertainty impact negatively on the performance of the housing sector in FCT, Abuja. The study also is in agreement with the finding of Shobayo (2017) who found a statistical negative significant relationship between the variables.

CONCLUDING REMARKS

Conclusion

In conclusion, it is pertinent to note that the nature of materials used in building houses in FCT, must be of standard quality that can safeguard lives and properties. The houses must be in good condition of living for most families and individuals' which will enhance their well-being. It is emphasized that since supply chain management (SCM) is responsible for the movement of materials from initial suppliers through to final customers, there is need for owners of buildings and construction workers/managers in FCT to always pay attention to the management of logistical issues associated with the supply chains management particularly as its affects purchase of building materials, supplier selection and transportation/delivery and general planning effort towards effective management of the supply chains, as well as building a strong relationship with the suppliers of the raw materials needed for the execution of quality building project for a better standard of living of members of the society not only in FCT but Nigeria as a whole.

Recommendations

Based on the above findings, the following recommendations were made:

1. There should be prompt payment of building materials by contractors/building owners to avoid poor supply chain management and proper coordination should exist between contractors and suppliers to eliminate poor supply chain management.
2. The study recommends that building engineers, managers, marketers and development control officers should ensure that they minimize the way and manner they overestimate the cost of materials in building since it has the negative impact of the performance of housing in Abuja.
3. The contractors and engineers should minimize the supply of substandard building materials used in building in FCT, Abuja since it negatively impacts on the performance of the housing sector in FCT, Abuja.

4. Environmental uncertainty should be seriously considered and monitored to adopt further actions for improvement since it negatively impacts on the performance of the housing sector in FCT, Abuja.

Contributions to Knowledge

This study has contributed to knowledge in that, to the best of the researcher's knowledge, it is the first it is kind that examines the impact of Building Material Supply Chains Management on the Performance of the Housing Sector in FCT. This is because FCT has witnessed the proliferation of housing units in the last 20 years of its existence. Thus the extent to which building material supply chain management plays a significant role in the development of the housing sector in FCT and Nigeria at large remains little unknown. Hence the outcome of this study provides the empirical framework for future engagement on housing policy and structure in FCT.

Limitations and Further Studies

There is a geographical limitation to this research study as the study focuses mainly on the happenings within the Federal Capital Territory, Abuja. Thus, it will be inadequate to generalize the results of this study to assume that it is going to be the same situation in Nigeria generally. However, generalization can be made provided that studies of this nature are conducted in different regions or States of the Nigerian Federation. We implore other researchers to explore these areas as they are clearly other interesting areas for future research work. Furthermore, future studies can be carried out to assess the Impact of Supply Chain Management on Housing Sector Performance Specifically in areas where Building Collapse is mostly recurring such as Lagos and South Eastern Part of Nigeria. Other researchers can evaluate the impact of Building Material Supply Chain Management using other robust techniques of data analysis such as structural equation modeling (SEM).

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