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Prices trend of selected building and construction materials on Ghanaian construction market: 2011–2016

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ABSTRACT

Increase prices of building and construction materials have the tendency of increasing the cost or prices of housing for both buying and renting purposes. This study investigates the prices trend of some selected common building and construction materials on the construction market in Ghana. Average annual prices of building materials from 2011 to 2016 were collected from Public Procurement Board and used in the determination of the trend in prices of building and construction materials in Ghana. The data were inputted into Microsoft Office Professional Plus Excel, version 2016 for generating graphs for analysis. It was revealed that materials such as fine aggregates, felt, aluminium roofing sheets and sandcrete blocks had an inconsistent (fluctuating) increase in price. It was further found that other materials such as coarse aggregates, ordinary Portland cement, concrete kerbs and high-tensile steel rods had a consistent increase in prices along the study period. The study concludes that there is general increase prices trend of the selected building and construction materials on the construction market in Ghana. It is recommended for government and the legislature to take the necessary measures and enact laws to control the factors that contribute to the increasing prices of building and construction materials.

KEYWORDS

Building materials; Ghanaian construction market; prices of building materials; prices trend

Introduction

Prices of building and construction materials are crucial in determining the cost of any housing in every country. It is undeniable fact that the cost of housing will increase when factors including the prices of building materials increase. The large proportion of materials in construction project makes it a significant factor that has a huge impact on the total cost of construction project (Windapo and Cattell 2012). Prices of building and construction materials are usually affected by economic factors including supply and demand of the materials or their raw materials. The prices of imported building and construction materials such as cement, reinforcement bars and sanitary ware fluctuate partly as a result of the effect of inflation and exchange rate (Oladipo and Oni 2012). Huan and Jianhua (2013) attribute the influence factors about building materials prices to the value of building materials, the value of money, supply and demand relationship, and national macro policy.

Akanni et al. (2014) indicated that there is an intense rise of the cost of building and construction materials in the Nigerian market, which has the tendency of affecting the performance of the construction industry in the country. The prices of building materials have become more expensive in Kenya because of the costs of importation and transportation of the materials (Wagura 2013). The cost of building materials and machinery are two leading factors to increase construction cost in Malaysia (Mansur et al. 2016). The continuous rise in the cost of building and construction materials is responsible for the increase cost of housing over between 1988 and 2008 in Cyprus (Pashardesa and Savva 2009). Obeng-Ahenkora and Danso (2018) identified the factors that influence the pricing decisions for determining the cost of building and construction materials in Ghana, and key among them are market-related factors.

Few studies have studied the prices trend of building materials, although it is a common occurrence in most countries. Mansur et al. (2016) studied the building materials price trend between the years 2009 and 2013 in Malaysia. Windapo and Cattell (2012) investigated the building materials prices trend in South Africa. There is the need also to study the prices trend of building and construction materials in

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other countries. Therefore, the current study investigates the prices trend of some selected common building and construction on the construction market in Ghana. Average annual prices of building materials from 2011 to 2016 were collected from Public Procurement Board and used in the determination of the prices trend of building and construction materials in Ghana.

Literature review

Price of building materials is a major determinant of the cost of acquiring a decent house. Construction of housing with low-cost building and construction materials provides affordable housing and increases the access to housing by people in the low-income bracket (Danso 2015). Modern construction industry lays much emphasis on sophisticated construction techniques and methods, and the use of conventional building materials, which are cost and energy intensive (Jalam et al. 2016). The spate of increased prices of housing is a concern to governments globally, particularly in the low-income countries (Danso 2013). One of the causes of housing shortage is increased prices of construction and building materials as the greater proportion of cost of housing is incurred from the materials.

Jalam et al. (2016) studied the cost of utilising some selected building materials such as sandcrete blocks, ordinary Portland cement, oil palm shell in concrete, rice husk ash, bonding and plaster mortars, and discovered 41% cost reduction in mass concrete and 12% in plaster mortar. Danso and Manu (2013) studied the main causes of the cost of building materials in Ghana and found that the high cost of the materials' manufacturing is a major contributor to the cost of materials in the country. The problem of increased prices of building and construction materials could be attributed to factors such as scarcity and high cost of imported building and construction materials (Aliyu et al. 2011).

A common trend shows an explosive increase in the prices of building and construction materials everywhere in the world, such as cement, steel and aggregates, and in Nepal, one major cause of the price increase is the lack of electricity, which has affected the cost of production of these materials (Schildkamp 2009). According to the author, another contributing factor in Nepal is the constant shortage of petrol and diesel, which causes a vast increase in the transportation costs, affecting the demand and supply of the building materials thereby leading to rapidly increasing prices.

A recent study by Danso and Obeng-Ahenkora (2018) identified 8 variables out of 29 obtained from the literature as the main factors that determine the price increase in building and construction materials on the construction market in Ghana. Theses variable include high prices of raw materials, crude oil prices, cost of energy, fuel cost and power supply, high labour cost, high transportation cost and high running cost. They further identified multi-collinearity relationship between the variables responsible for prices increase of building and construction materials.

Research method

The study selected eight (8) common building and construction materials on the construction market in Ghana for the investigations. The selected materials are coarse aggregate, fine aggregate, ordinary Portland cement, felt, aluminium roofing sheet, concrete kerb, sandcrete blocks and high tensile steel. These materials were selected because they are readily available and abundant on the market, and both construction professional and none professionals can easily relate to them. Generally, the prices of the building materials on Ghanaian market are not the same throughout the country. There are differences in the prices due to different geographical location. An example is the price of GHACEM ordinary Portland cement, which is manufactured in the Southern part of the country, and therefore transporting it to the Northern part of the country requires higher transportation cost, which makes the price of the cement higher in the Northern part than the Southern part.

This study relied on secondary data which was obtained from Public Procurement Board of Ghana. The prices quoted by the Public Procurement Board were the average prices that were tabulated to represent the average cost of building and construction materials in the country. Due to the selected materials, the available data obtained were from the year 2011 to the year 2016, which constituted the study period. The data were inputted into Microsoft Office Professional Plus Excel, version 2016 for generating graphs for analysis. The graphs were charted using trend lines, bars, legends and axis labels.

Results

Coarse aggregate

Coarse aggregate on the construction market are available in two forms, the machine crashed and hand broken. The hand-broken aggregate data were

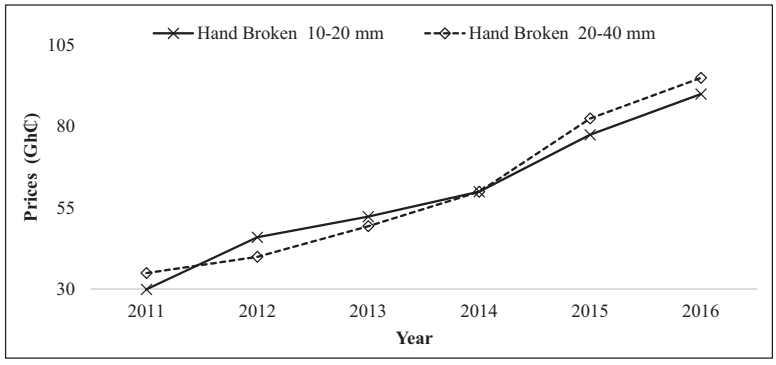

Figure 1. Price trend of coarse aggregates.

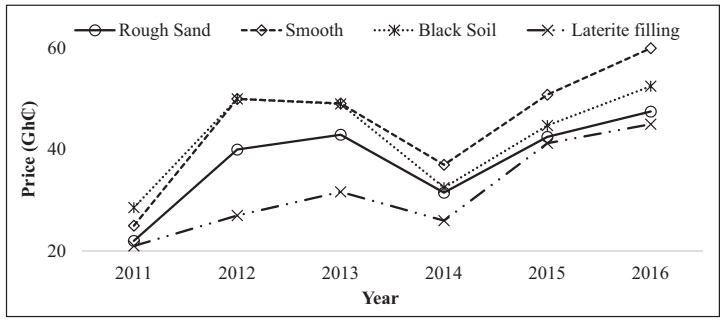

Figure 2. Price trend of fine aggregates.

obtained and are available in sizes 10–20 mm and 20–40 mm. Prices of these sizes of hand-broken aggregates are analysed and presented in Figure 1.

Figure 1 shows the rate of price change for hand-broken coarse aggregates available on Ghanaian construction market. Prices from the year 2011 to the year 2016 for both 10–20 mm and 20–40 mm sizes kept changing between these periods. The prices kept rising without a single decline over the years. It could be seen that there is a consistent increase in prices over the period of the years under study with 200% and 171.43% increase from the year 2011 to the year 2016 for 10–20 mm and 20–40 mm sizes, respectively.

Fine aggregate (sand)

Prices of sand (rough sand, smooth sand, laterite filling and black soil) obtained were used to study the trend form the year 2011 to the year 2016. Figure 2 shows the trend of prices over the period of years.

It could be observed that there was an increased price between years 2011 and 2012 and then reduced till the year 2014 for smooth sand and black soil, after which the prices increase continuously till the year 2016. For rough sand and laterite filling, the prices increased from the year 2011 to 2013 and then decreased in the year 2014, after which the prices increased again till 2016. There was generally a fluctuating trend in prices for all the four types of fine aggregates. However, there was an overall price increase in the fine aggregates over the period under study. There were 116%, 140%, 84% and 114% increase in the rough sand, smooth sand, black soil and laterite filling, respectively, between the years 2011 and 2016.

Cement

Ordinary Portland cement (GHACEM) 50 kg is the most popular type of cement in the Ghanaian construction market. Prices obtained were used for the price trend analysis displayed in Figure 3.

There was a consistent increase in prices without any decrease over the years under study. However, prices remained unchanged between years 2012 and 2013 and then continued to increase till 2016. The cement recorded a general increase of 163% in prices from the year 2011 to the year 2016.

Felt

Felt on the Ghanaian construction market are available in two different brands, namely, the British felt (1.0 m × 20 m bundle) and China felt (1.0 m × 20 m bundle). The general trend of prices of the felt brands

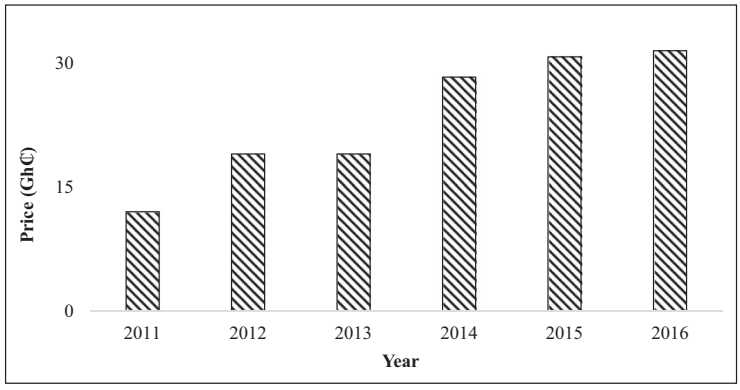

Figure 3. Price trend of ordinary Portland Cement (GHACEM) 50 kg.

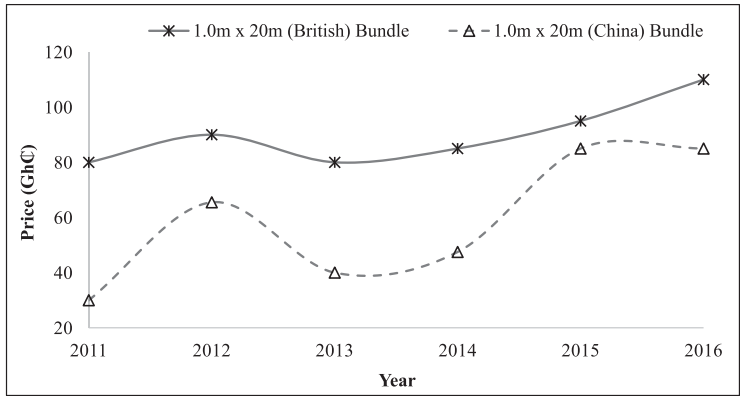

Figure 4. Price trend of felt.

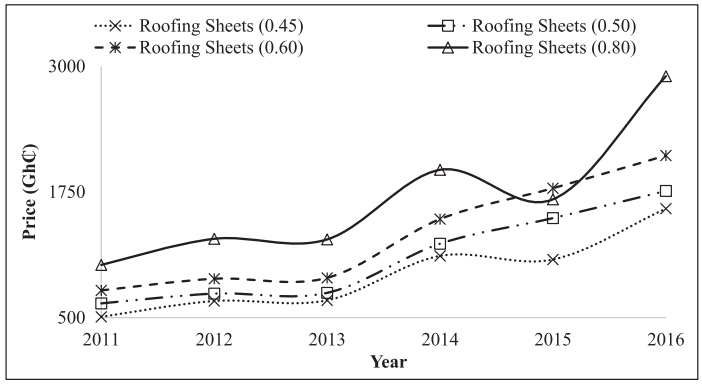

Figure 5. Price trend of aluminium roofing sheets (short span).

fluctuated from the years 2011 to 2016 as indicated in Figure 4.

For both brands of felt, the prices increased from the years 2011 to 2012 and then reduced in the years 2013. The price for British felt (1.0 m × 20 m bundle) recorded continuous increase from the years 2013 to 2016. However, the price of China felt (1.0 m × 20 m bundle) increase from the years 2013 to 2015 and then stabilised between the years 2015 and 2016. Generally, there was an increase in prices of the study period of 38% and 183% for British (1.0 m × 20 m bundle) and China felt (1.0 m × 20 m bundle), respectively.

Aluminium roofing sheets

Short-span aluminium roofing sheets are available in different dimensions (thicknesses) in Ghanaian construction market. The available thicknesses are .45, .50, .60 and .80 mm. Figure 5 shows the trend of prices of the aluminium roofing sheets from the year 2011 to the year 2016.

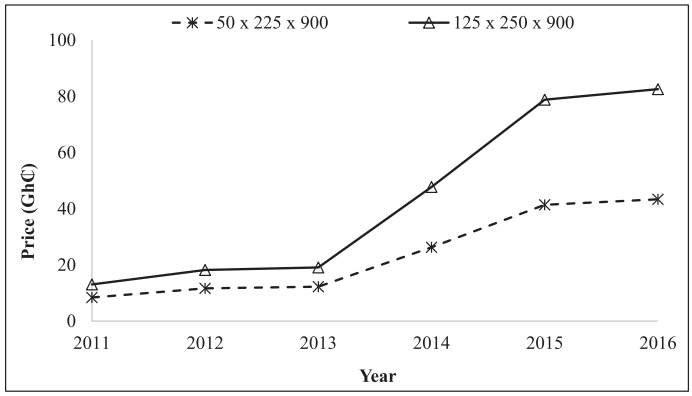

Figure 6. Price trend of Concrete Kerbs.

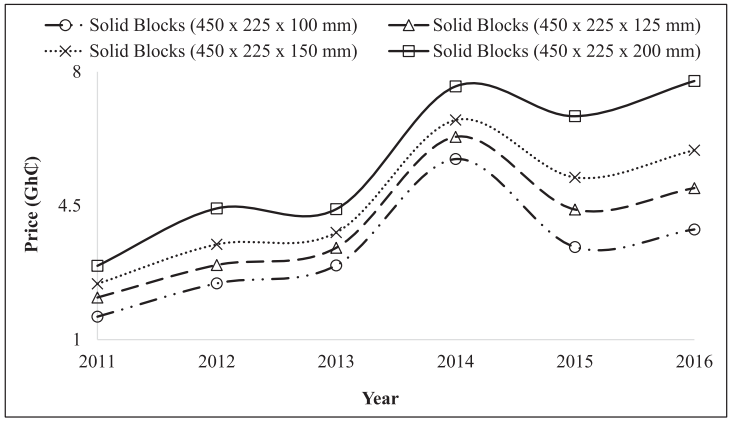

Figure 7. Price trend of solid sandcrete blocks.

Figure 5 depicts that all the prices of the short-span aluminium roofing sheets generally recorded increased trend of 212%, 174%, 174% and 183%, respectively for .45, .50, .60 and .80 thicknesses over the study period. However, there was a modulating trend in prices for all the dimensions of the short-span aluminium roofing sheets in the Ghanaian construction market.

Concrete kerbs

The data obtained for concrete kerbs provided two sizes, which are 50 mm × 225 mm × 900 mm and 125 mm × 250 mm × 900 mm. Figure 6 shows that the prices of the concrete kerbs over the study period have been increasing consistently without a single fall in the prices.

Though there were slight increases between years 2011 and 2013, the rate of increase between 2013 and 2015 years was very drastic. The general percentage change in prices from the year 2011 to the year 2016 for the concrete kerbs 50 mm × 225 mm × 900 mm and that of 125 mm × 900 mm are 416% and 532%, respectively.

Sandcrete blocks

Four different sizes (450 mm × 225 mm × 100 mm, 450 mm × 225 mm × 125 mm, 450 mm × 225 mm × 150 mm, and 450 mm × 225 mm × 200 mm) of solid block data were obtained for the analysis. Figure 7 shows the graphical representation of the price trend of the solid sandcrete blocks over the study period. There was generally a fluctuating trend in prices for all the four sizes of solid sandcrete blocks.

It can be seen that the prices of the blocks fluctuated throughout the study period with increasing trend. The total increase in prices of the solid sandcrete blocks were 143%, 136%, 142% and 165%, respectively for 450 mm × 225 mm × 100 mm, 450 mm × 225 mm × 125 mm, 450 mm × 225 mm × 150 mm and 450 mm × 225 mm × 200 mm between the years 2011 and 2016.

High-tensile steel rod (12 m)

Data on four sizes (10 mm diameter, 12 mm diameter, 16 mm diameter and 20 mm diameter) of high-tensile steel rods with length 12 m per ton were obtained.

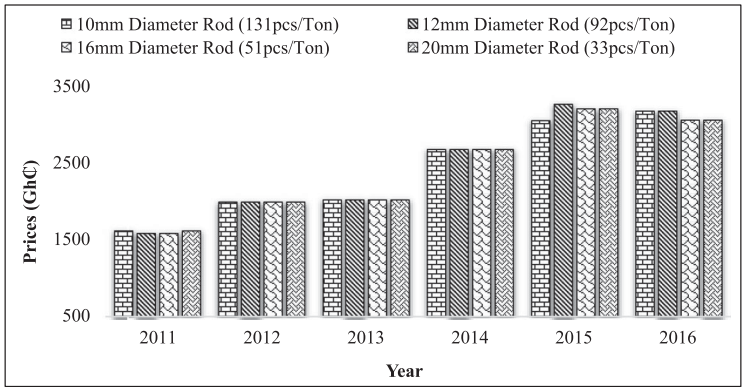

Figure 8. Price trend of high tensile rod – 12 meters.

The trend of the prices of the high-tensile steel rod is shown in Figure 8.

The result shows a consistent increasing trend of the prices of all the four sizes of the high-tensile steel rods with length 12 m per ton over the study period. There were almost stable prices between 2015 and 2016 years. There were general increases from 2011 to 2016 of 96%, 101%, 93% and 89%, respectively, 10 mm diameter, 12 mm diameter, 16 mm diameter and 20 mm diameter of the high-tensile steel rod.

Discussion of the findings

The price trend for the selected building materials was analysed and is displayed in Figures 1 to 8. A careful review of the result indicates an increase in the monetary value or cost of these selected building and construction materials over the study period. It emerged that the prices increased consistently with regard to some materials with an undulating nature, while with other materials there was fluctuating increase along the study period.

Selected building materials such as fine aggregates, felt (China and British), aluminium roofing sheets and sandcrete blocks had an inconsistent (fluctuating) increase in price. This implies that there was increase in price in some years, and the prices decrease in other years along the study period. Although there were fluctuating changes in the prices of the materials, the trend was on the ascendancy, which resulted in increased prices over the period of the study. The other selected building materials such as coarse aggregates, ordinary Portland cement, concrete kerbs and high-tensile steel rods had a consistent increase in prices along the study period. Notable among the materials are a concrete kerb, which recorded general increase of between 416% and 532% over the study period. Similar results were found in previous studies. Windapo and Cattell (2012) identified rapid increase in prices of building and construction materials such as reinforcement steel, cement and copper in South Africa. Tupenaite et al. (2017) studied the factors that determine housing market fluctuation in Lithuania and found that the housing sector in the country was experiencing prices movement which was attributed to economic factors.

Ihuah (2015) reported a consistent price increase in building materials over a period of ten years and its relative effect on prices of rentals of building and overall construction cost. The consistent increase in these building materials in Ghana will in one way or the other affect overall project cost thus increasing building cost and rentals of the building. Aibinu and Jagboro (2002) and Jagboro and Owoeye (2004) observed an increase in prices of building and construction materials which influence the fluctuation in the cost and sometimes result in project abandonment.

As the cost of the building materials increases, the cost of building increases, which indicates that they are directly correlated, even though a correlation analysis is limited in this study. In a study by Windapo et al. (2017), it emerged that the levels of building cost are significantly and positively related to the cost of building materials. Pashardesa and Savva (2009) also found house prices to be particularly sensitive to the cost building and construction materials. Therefore, if building material costs increase, it has a direct association with the increasing cost of buildings. Windapo et al. (2017) cautioned that if the trend of increase in prices of building and construction materials is unchecked by the government and other related bodies, an increase in the rent payable by people willing to rent and/or own their houses is inevitable. The main determinants of the increased prices of building and construction materials in the Ghanaian construction market have been investigated by Danso and Obeng-Ahenkora (2018). Their study found high prices of materials, crude oil prices, cost

of energy, fuel cost and power supply, high labour cost, high transportation cost and high running cost as the main factors contributing to the increase in prices of building and construction materials in Ghana. These factors need to be controlled in order to prevent further increases in the building and construction materials' prices. Therefore, government, the legislature and other stakeholders in the construction industry market have a responsibility to ensure that this trend discontinues.

Implications of the study

This study contributes to the general body of knowledge in construction materials, specifically in the pricing of building and construction materials. It identified the price trend of some selected common building and construction materials on the construction market in Ghana. The purpose of studying the increased prices of building and construction materials is to bring to the attention of the stakeholders (such as researchers, construction practitioners and Government) on the problem of escalating cost of building materials in order to take the necessary steps to curb its effect on housing cost. The findings of the study are anticipated to assist researchers and practitioners of the construction industry to focus their attention on how to investigate into the possible use of affordable building materials order to ensure sustainable construction. The implications of this study are not limited to researchers and construction industry practitioners alone. The Government of Ghana could adopt the findings of this study to help in introducing measures that will check the rising cost of building and construction materials which has the tendency of increasing the total cost of buildings. It is obvious from the results that the prices of the studied building and construction materials will keep raising year after year; therefore, it is expected of government to come out with policies to control the contributing factors of price increases of building and construction materials.

Limitations of the study

The study considered only coarse aggregate, fine aggregate, ordinary Portland cement, felt, aluminium roofing sheet, concrete kerb, sandcrete blocks and high-tensile steel. There are other building materials in Ghana which can also be useful in providing information for such study. The average annual prices of building materials from 2011 to 2016 were collected from Public Procurement Board and used in the determination of the trend in prices of building and construction materials on the construction market in Ghana. Due to unavailability of data, the year 2017 could not be included in the study.

Summary and conclusion

The study aimed at investigating the trend in the prices of some selected common building and construction materials on the construction market in Ghana from the year 2011 to the year 2016. It was revealed that some selected building materials such as fine aggregates, felt (China and British), aluminium roofing sheets and sandcrete blocks had an inconsistent (fluctuating) increase in prices. Furthermore, it was found that others selected building materials such as coarse aggregates, ordinary Portland cement, concrete kerbs and high-tensile steel rods had a consistent prices increase over the period of the study. All the materials investigated recorded general prices increase over the period of the study. The study, therefore, concludes that there is consistent as well as fluctuating increase prices trend of the selected building and construction materials in the Ghanaian construction market. The outcome of this study is anticipated to help construction professionals to understand the problem of increasing prices of building and construction materials in the construction market in order to take the necessary measures to curb its impact on the cost of housing. Similarly, government and the legislature could also enact legislation to control the factors that result in the price increase of building and construction materials. Furthermore, it is recommended that further research should be carried out to predict the future trend of prices of building and construction materials in Ghanaian construction market if the present conditions remain unchanged.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Aibinu AA, Jagboro GO. 2002. The effects of construction delays on project delivery in Nigerian construction industry. Int J Project Manage. 20(8):593–599.

Akanni P, Oke A, Omotilewa O. 2014. Implications of rising cost of building materials in Lagos State Nigeria. SAGE Open. 4(4):215824401456121. http://dx.doi.org/10.1177/2158244014561213

Aliyu AA, Kasim R, Martin D. 2011. Factors affecting housing development in Makama Jahun Area of Bauchi Metropolis, Nigeria. I JTEF. 2(4):263–268.

Danso H, Obeng-Ahenkora NK. 2018. Major determinants of prices increase of building materials on Ghanaian construction market. OJCE. 08(02):142–154. https://doi.org/10.4236/ojce.2018.82012

Danso H. 2015. Use of agricultural waste fibres as enhancement of soil blocks for low-cost housing in Ghana [PhD Thesis]. School of Civil Engineering and Surveying, University of Portsmouth. http://eprints.port.ac.uk/id/eprint/20762

Danso H. 2013. Building Houses with Locally Available Materials in Ghana: Benefits and Problems. International Journal of Science and Technology. 2(2):225–231. http://www.journalofsciences-technology.org/archive/2013/feb_vol_2_no_2/feb_2013.php

Danso H, Manu D. 2013. High cost of materials and land acquisition problems in the construction industry in Ghana. Int J Res Eng Appl Sci. 3(3):18–33. http://www.euroasiapub.org/IJREAS/mar2013/3.pdf

Ihuah PW. 2015. Building materials cost increases and sustainability in real estate development in Nigeria. AJESD. 4(3):218–233. http://dx.doi.org/10.1504/ajesd.2015.071907

Jagboro GO, Owoeye CO. 2004. A model for predicting the prices of building materials using the exchange rate in Nigeria. The Malaysian Surveyor. 5(6):9–14.

Jalam UA, Jalam AA, Sale IM. 2016. Cost evaluation of utilising building materials derived from agricultural waste as sustainable materials for lightweight construction. Econ Environ Stud. 16(4):673–685.

Huan Z, Jianhua Z. 2013. Analysis of factors to cause the price change of building materials. Adv Mater Res. 683: 668–671.

Mansur SA, Abdul Hamid AR, Yusof NA. 2016. Rising trend in construction cost and housing price. J Adv Res Bus Manage Stud. 3(1):94–104.

Obeng-Ahenkora NK, Danso H. 2018. Principal component analysis of factors influencing pricing decisions of building materials in Ghana. Int J Constr Manage. https://doi.org/10.1080/15623599.2018.1484553

Oladipo FO, Oni OJ. 2012. A review of selected macroeconomic factors impacting building material prices in developing countries – a case of Nigeria. Ethiopian J Environ Stud Manage. 5(2):131–137.

Pashardesa P, Savva CS. 2009. Factors affecting house prices in Cyprus: 1988–2008. Cyprus Econ Policy Rev. 3(1):3–25.

Schildkamp M. 2009. Suitability of local soil for cost saving construction techniques. Smart Shelter Foundation. https://www.smartshelterfoundation.org/wp-content/uploads/2014/07/SSF-soil-testing-manual.pdf

Tupenaite L, Kanapeckiene L, Naimaviciene J. 2017. Determinants of housing market fluctuations: case study of Lithuania. Procedia Eng. 172:1169–1175.

Wagura TJ. 2013. Determinants of housing supply in Kenya [Post Graduate Diploma Thesis]. Kenya: School of Built Environment, University of Nairobi.

Windapo A, Cattell K. 2012. Examining the trends in building material prices: built environment stakeholders' perspectives. Manage Constr Res Pract. 1:187–201. https://www.irbnet.de/daten/iconda/CIB_DC25658.pdf

Windapo A, Odediran S, Moghayedi A, et al. 2017. Determinants of building construction costs in South Africa. J Constr Bus Manage. 1(1):8–13.