PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

AN ASSESSMENT OF THE IMPACT OF INFLATION ON CONSTRUCTION MATERIAL PRICES IN NIGERIA

Ogun Oghenekevwe[1], Ogunsina Olusola[2] and Ugochukwu Stanley Chukwudi[3]

[1] Globacom Nigeria PLC, Asaba, Delta State, Nigeria.
[2] Department of Quantity Surveying, Nnamdi Azikiwe University, Awka, Nigeria.
[3] Department of Quantity Surveying, Nnamdi Azikiwe University, Awka, Nigeria.

Abstract: The goal of most countries is the desire to maintain a stable price level of goods and services. This however, appears to be an uphill task given the incidence of inflation presently ravaging developing economies of the world. Inflationary increase in the price of construction materials has been one of the major banes to development and a contributing factor to frequent cost overruns and subsequently project abandonment. The research studied the effect of inflation on construction material prices in Nigeria from 1998 to 2007, using Lagos as the study area. The study aimed at establishing a relationship between inflation and construction material prices, so as to build a model for forecasting the effect of inflation on construction materials. A comprehensive review of literature was structured to cover inflation, the Nigerian Economy and the construction industry while Data was collected from Nigerian Institute of quantity Surveyors (NIQS) journals, Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) documents. Regression analysis was performed on the data, and the results showed that a third order polynomial equation relationship exist between cumulative inflation rate and construction material prices. Based on the results; the significant level of correlation reached, it was inferred that cumulative inflation rate can be used to predict the price of building materials. From the descriptive analysis and literature survey carried out, it was discovered that inflation rates in Nigeria have been far from stable, and have affected material prices non-uniformly. Other macro-economic factors such as importation, interest rate, Gross Domestic Product (GDP) and political regimes also contribute to upward trend in price movement. The study thus advocated for more involvement of construction professionals in Government policy making, a systematic reduction in importation level, more use of locally made building materials and development of the country's construction data base to enable the usage of the Construction material inflation rate (CMIR) which will serve as a better computation method for fluctuation in material prices and consequently, more realistic estimating and cost planning.

Key Words: *Assessment, Construction material, Impact, Inflation, Nigeria, Prices.*

1. INTRODUCTION

Construction projects involve extensive use of materials. According to Obiegbu (2003), the construction industry is vulnerable to inflation in prices of materials. Materials needed for erecting and completing construction works could amount to about 35-45 percent of the total project cost while in some other projects, the materials cost may be as high as 60 percent.

Nwachukwu (2004) further explained that in most capital projects, materials account for more than 50 percent of their production cost. Material resources are thus the heart and life

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

wire of any construction system. This simply means that increase in the cost of materials will affect the total cost of construction and subsequently housing supply in no small measure. Central Bank of Nigeria (CBN) (2002), stressed that inflation is a social malady as well as a pervasive economic process whose effects are felt, to some degree, by every citizen and in all sectors of the economy.

Inflation is thus felt in the construction sector of the economy by the increase in construction material prices. Kaming et al (1997) stated that inflationary increases in material cost is the major cause of construction cost overruns in Nigeria. Wahab (1985) further established that the prices of building materials in Nigeria have increased steadily over the years and this inflationary trend has led to higher construction costs. These frequent increases give rise to cost overruns, claims, housing supply shortage leading to high cost of urban housing accommodation, construction cost estimate losing usefulness within short periods, difficulty in forecasting and planning, and frequent contract price variations, all of which often leads to project abandonment (Nwuba, 2004;Akwusola, 2007)

In a similar view, Onashile (2008) submitted that the Nigerian construction industry has been going through a very trying period and that project that would have help in uplifting the standard of living have either been abandoned or did not take-off at all due to lack of funds and rising cost of construction material. Construction costs within a preceding year can move up to as about 30 percent.

Inflation causes serious problem to contractors. Oyediran (2006) observed that the rate of inflation can cause serious problems in the economic accruals or rate of return to constructors for works undertaken, thus loss of profit. In the traditional procurement method, firm price contracts, where the contractor is paid in arrears. Inflationary forces render submitted bids unrealistic. This has made contractors' quantity surveyors more aware of the need to price inflationary risk at the pre-contract stage.

Ashworth (1983) opines that inflation can have an important effect upon the financial consequences of alternatives design solutions. The calculation of cost-in-use of alternative design solutions is often done without considering the impact of inflation on construction material prices. In order to factor inflation risk into pre-contract investment analysis, the appraiser thus requires an understanding of the relationship between inflation and construction materials prices.

Inflationary effects on project appraisal are very significant and could pose difficulties to property developers. Pitcher (1994) argued that inflation will also affect the cash flows needed to be discounted (as cited in Oyediran, 2006).

Globalization, high returns on investment is no doubt attracting investors to Nigeria. These investors require adequate inflation forecasting techniques using the best, realistic information available at the time of the project cost planning and estimating process. However, with the ravaging effects of persistent price increases in Nigeria, some of these investors are also discouraged from investing in the construction sector.

*PM World **Journal***
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

1.1 PURPOSE/OBJECTIVES OF THE STUDY

The purpose of this study is to establish a relationship between inflation and construction material prices, so as to develop a model for forecasting effect of inflation on construction materials. Specifically, the objectives of the study include:
i) To study the inflationary trend in the Nigerian economy and examine this trend in the Construction industry using prices of construction materials as input.
ii) To determine if inflationary forces affect the prices of selected construction materials uniformly in Nigeria.

1.2 STUDY HYPOTHESIS

The following hypotheses were developed to promote the achievement of the purpose of the study.

H_0: There is no significant relationship between inflation rate and the trend in price movement of building materials

H_1: There is a significant relationship between inflation rate and the trend in price movement of building materials

1.3 SCOPE OF THE STUDY

The study considers those materials, which are the major cost drivers in building construction, namely, cement, reinforcement bars, granites(coarse aggregate), sharp sand(fine aggregate),sandcrete blocks, long span aluminum roofing sheet, emulsion paint.

The study also covers a period of ten years from 1998 to 2007. The length of time was considered considerable to allow the study to establish a concrete relationship between inflation and the price of construction materials. The base year is 2002 because there was stability in the prices of construction material at that period. This is in line with the submissions of Eze et al (2007) when he defined the base year as the reference point on which all comparison are based and the choice should be based on these principles: The year to be chosen as base should be a stable or a reasonable normal period and must not be too distant in the past.

The research work is limited to Lagos state in south western geopolitical zone of Nigeria. This is because there is homogeneity of data in the zone and majority of building material are manufactured in the zone, while it also serve as a centre for the importation of building materials.

2. LITERATURE

2.1   AN OVERVIEW OF THE INFLATION PHENOMENON

The goal of most countries is the desire to maintain a stable price level (CBN, 1996). Oyediran (2003) supports this assertion by further surmising that price stability is one of the principal economic goals in any economy. Monye-Emina (2007) however argues that this

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

appears to be a tall order given the incidence of inflation presently ravaging economies of the world especially developing ones.

Melberg (1992) defined inflation as a general rise in the price level in an area over a certain period of time. Iyoha et al (2003) explained inflation to be a condition of general and persistent rise in prices. An economy is thus regarded as suffering from inflation if it is undergoing a period of continuously rising prices (Curwen, 1976). Inflation is measured in periods sufficiently long enough to eliminate bias arising from short-term. According to Wikipedia (n.d), the chief measure of inflation is the inflation rate, which is the percentage rate of change of price index over time (CBN, 1996).

2.2   TYPES/CAUSES OF INFLATION

Anyanwu (1993); Iyoha et al (2003) identified a number of forms of inflation to include: demand-pull, cost push, structural, monetary and imported inflation. The demand pull inflation is induced by excessive demand not matched with increase in supply. Here too much money is chasing too few commodities .It thus occurs when aggregate demand for goods and services is greater than the aggregate supply. The cost push inflation arises from increases in the cost of the factors of production, especially rising wages emanating from trade union activities-embodying a social political view.

Johnson (1973) ; CBN (1996) observed that imported inflation arise from international trade whereby, inflation is transmitted from one country to another and is more so during a period of rising prices all over the world. Price effects are transmitted by internationally traded goods and services.

Jhingan (2006) identified two common types of inflation with respect to the pace or speed of rise. They include:

   i.   Hyper Inflation**:** When prices rise very fast at double or triple digit rates from more than 20 to 100 percent per annum or more. Hyper inflation occurs when the price level rises at a very rapid rate. In this case, money losses its function as a store of value and as medium of exchange. The main cause of hyper inflation is an enormous expansion of the money supply.

   ii. Creeping Inflation: When the rise in prices is very slow like that of a small or creeper. It is a sustained rise in prices of annual increase of less than 3 percent.

2.3 INFLATION AND THE NIGERIAN ECONOMY

Inflation is one of the intractable problems facing Nigerian economy. Inflation has been considered to be a direct result of the policies of the country's governments.

The beginning of inflation in Nigeria can be said to be in 1951 when ministerial government was introduced. Fakiyesi (1996) mentioned that the Nigerian economy registered low rates of inflation in the years immediately after independence; this was mainly as a result of the civil war. Nwuba and Adeagbo (2007) established that since the end of the Nigeria civil war in

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

1970 and especially following the introduction of the structural adjustment programme SAP, in 1986, urban housing construction costs and house rents have been rising at uncomfortable rates. This situation has resulted in serious urban housing problems resulting in multiplicity of slum settlements and shanty towns

According to Anyanwu (1993) the oil boom of the 1970s brought with it fundamental changes in the Nigerian economy, the structure of policy incentives and controls encouraged import oriented production and consumption pattern with little incentives for non-oil exports. Again, the competiveness of the agricultural sector in the world market was eroded by over-valued naira exchange rate, inadequate pricing policies, rural-urban migration and neglect arising from 'too much oil syndrome'. However, prior to 1986, precisely from mid 1981when the world oil market began to collapse (due to glut), Nigeria witnessed a traumatic economic crisis. The resultant fall in oil exports and prices were reflected in foreign exchange receipts and government revenues. Consequently, the external resources fell sharply, foreign debts mounted in the face of rising imports, government deficits widened and efforts at containing the adverse development created some other serious problems such as economic depression, unemployment, persistent balance of payment deficits, rising prices/inflation. According to Anunobi (1997) these inflationary trends had rippling effect on the Nigerian construction industry.

There is no gainsaying the fact that the importance of construction to the Nigerian economy cannot be overemphasized. Unfortunately, this sub sector has been one of the worst hit by the debilitating effects of inflation.

Various authors have over the years enumerated the vast benefits of the Construction sector to the Nigerian economy. According to Hillebrandt (1974) successive governments in Nigeria have used the construction industry as a regulator of the economy as it constitutes a large proportion of the Gross Domestic Product (GDP). Ajanlekoko (1990); Oliver (2005) affirmed the construction industry to be the prime motivator of the Nigerian economy; it represents 60% of the capital investment and 30 percent of GDP. Similarly, Onashile (2008) describes the construction industry as a barometer for measuring the economic growth of Nigeria.

In an attempt to establish the overall specific factors that promote inflation in Nigeria, Wahab (1985) classified the causes of inflation in the Nigerian construction industry into two broad categories namely Economic/External and Internal or factors emanating from Nigerian circumstances. He states that the economic factors causing inflation in the Nigerian construction industry are those which flow from a straight forward application of the laws of supply and demand or from the effect of government fiscal policies; these factors are not influenced by individual companies but by governments or multi-national organizations.

While internal are those arising out of our peculiar Nigerian circumstances, which inflate construction costs in Nigeria, this category of factors can be remedied by the determined action of individuals or groups of people in either the public or private sectors. He went further to states that under the economic factors, the factors that causes inflation include:

- The shortage of locally manufactured building materials.

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

- The imposition by government of excise duty on locally manufactured building products or high import duty on imported building materials.
- Government fiscal policy determines interest rates charged by the bank and other finance houses.
- Political instability
- Excessive reliance on importation of materials for construction works and construction equipment.

While internal factors, the factors that causes inflation includes:

- Uncontrolled boom of construction works which lead to pumping of too much money into the economy.
- Over dependence on foreign expertise in the construction industry in Nigeria.
- Inefficient management of construction works on site.
- Inadequate funding of the project by the employer.
- Inadequate pre-contract documentation.
- Design of a project in excess of the clients brief.
- Restricted importation of those building materials and construction equipment, which are not manufactured in the country.

2.4 INFLATION AND CONSTRUCTION CONTRACTS

Onyechi (1990) opined that inflationary increases in contract sums for works are usual in Nigeria. He also mention that this inevitably arises in construction project because there is usually an appreciable true gap between prices offered and the actual purchase of resources for construction, since prices are usually not static. This situation is getting worse as days go by. The causes of these inflationary escalations are clearly beyond the control of the immediate contract participants-clients, designers and contractors.

Inflation in construction material prices affects the construction contracts especially where such contracts are let on a firm price basis. This implies that the client will not entertain any increase in the contract sum as a result of fluctuations in the prices of materials and labour. In order to prevent a situation in which high inflation erodes the contractor's margins, the contractor factors inflation risk into his pre-tender estimating processes (Ashworth, 1983). An understanding of the relationship between prices of construction materials over the preceding years and inflation rate is fundamental for pricing inflation risk at pre-contract stage.

Ramus (1981) also observed that in fluctuating price contracts, increases or decreases in material prices require that payment become due to the contractors from the employer and vice versa. In the Nigerian situation however, it is always a one-way direction of employer to contractor as a result of inflation.

In addition to this, provisions of the standard forms of contracts which gives guidelines on methods of valuations or adjustment in calculation of the actual changes due to fluctuating inflationary trend on the economy is affected by severe inflation. For instance, clause 39, and 40 of JCT 1980, form of contract, include provision for adjustment for fluctuations, but

*PM World **Journal***
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

because of the inherent problems encountered in valuation or calculation for any changes, these become mostly green area for dispute in contract administrations. Also, clause 38, of JCT 1980 which embodies the firm price contract (i.e contracts within one year), is rendered ineffective due to frequent inflations witnessed in Nigeria within a year.

Okike (2004) argues that no matter the method used for reimbursement for fluctuation, the actual increases or decreases in costs and prices of resources used can never be fully assessed or recovered, and in most cases are more or less than the amount incurred from fluctuation

3. METHODOLOGY

Data for the study was obtained mainly from secondary sources only, since the research is quantitative in nature. Quarterly prices of construction materials were collected from Nigerian Institute of Quantity Surveyors (NIQS) published journals, while the quarterly inflation rate is collected from Central Bank of Nigeria (C.B.N) statistical bulletin, and National Bureau of Statistics (NBS) bulletin. These data obtained were presented in tables and also graphs for proper pictorial elucidation.

The method of sample collection adopted is the stratified random sample technique. In view of this, an analysis of the percentage constituent of each material to the overall material cost was carried out on two sampled duplexes and bungalows. Percentage contributions reveal that cement amounts to 12.07%, reinforcement 16.67%, granite 6.52% block 5.93%, long span roofing sheet 5.12%, sharp sand 3.79% and paint 3.63%. Thus, a material whose percentage is above three was selected. The sum of the selected materials amounts to 53.73 percent of the total cost of materials for the sampled buildings.

Data was analyzed in the following manner; the cumulative inflation rate was obtained by addition of the inflation rate of the previous quarter to that of the recent quarter to obtain the cumulative inflation rate of that quarter. The average price change for basket of items from one period (the base period) to another period (the current period) was also measured by a composite price index. Each item was weighted according to its importance in the basket.

The weighted aggregative price index was then used to compute the price index of the seven selected construction materials with their weight being the percentage which they contribute to the overall material cost.

The weighted aggregate price index (WAPI) was computed using the following formula.

$$\text{WAPI} = \frac{\sum_{j=1}^{k} P_{ni} W_i}{\sum_{j=1}^{k} P_{oi} W_i} \ X \ 100 \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

Where:

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

WAPI = weighted aggregate price index

P_{ni} = price of commodity in the current year or given year.

P_{oi} = price of commodity in the base year

W_i = weight for the commodity.

In simple average, each item in the group is regarded as having equal importance. But in actual fact, items may vary in importance. To obtain a representative average, each item was multiplied by a suitable 'weight'' corresponding to its importance and dividing the sum of the products by the sum of the weights.

The weighted mean was calculated using the following relationship.

$$X = \frac{\sum_{j=1}^{n} W_i X_i}{\sum_{j=1}^{n} W_i} \quad \text{………………………………………(2)}$$

Where:

$\overline{X}$ = weighted mean

W_i = weight

X_i = observation

Therefore, to obtain a representative average for the weighted aggregative price index, the WAPI and the weighted mean are combined mean to arrive at equation 3.

$$AWAPI = \left(\frac{\dfrac{\sum_{j=1}^{k} P_{ni} W_i}{\sum_{j=1}^{k} W_i}}{\dfrac{\sum_{j=1}^{k} P_{oi} W_i}{\sum_{j=1}^{k} W_i}} \quad X \quad 100 \right) \quad \text{…………………(3)}$$

*PM World **Journal***
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Where: AWAPI = average weighted aggregative price index,

The construction material inflation rate (CMIR) is thus derived by equation 4

$$CMIR = \left(\frac{\dfrac{\sum_{j=1}^{k} P_{ni} W_i}{\sum_{j=1}^{k} W_i}}{\dfrac{\sum_{j=1}^{k} P_{oi} W_i}{\sum_{j=1}^{k} W_i}} \quad X \quad 100 \right) - 100 \qquad (4)$$

In examining the inflationary trends in the Nigerian economy the inflation rate was plotted against each quarter, while in determining the inflationary trend in the construction industry of the Nigerian economy using prices of construction materials as input, the average weighted aggregative price index using 2002 as the base year was used.

Furthermore, while examining if inflationary forces affect the prices of the selected construction materials uniformly; the prices of construction materials were plotted against the cumulative inflation rate in quarters.

The simple regression analysis was also used to test if statistical relationships exist between inflation rate and price of construction materials.

4. DATA PRESENTATION AND ANALYSIS

Data obtained on inflation rates witnessed in Nigeria, as well as construction material prices for the 10 year period under study are as indicated in table 1.Tables 2 and 3 show the cumulated inflation rates and construction materials weights as computed, while table 4 highlights the prices. Further data on computations for the weighted aggregative mean, construction materials inflation rate (CMIR), trend in price movement are elucidated in table 5.

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Table 1. Inflation rates in Nigeria from 1998 – 2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Q1	7.0	11.6	2.7	11.9	18.9	10.5	17.8	12.5	17.4	5.2
Q2	6.4	12.1	0.9	16.6	16.4	10.1	19.4	12.9	15.5	6.4
Q3	8.2	9.8	3.3	18.4	14.8	10.7	18.2	16.8	10.0	4.1
Q4	10.0	6.6	6.9	18.9	12.9	14.0	15.0	17.9	8.2	6.6

(Source: CBN Research Department Series , NBS Statistical Bulletins)

Table 2. Cumulative Inflation rate.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Q1	7.0	43.2	74.4	97.4	170.2	224.8	277.4	342.5	407.5	446.4
Q2	13.4	55.3	75.3	114.0	186.6	234.9	296.8	355.4	423.0	452.8
Q3	21.6	65.1	78.6	132.40	201.4	245.6	315.0	372.2	433.0	456.9
Q4	31.6	71.7	85.5	151.3	214.3	259.6	330.0	390.1	441.2	463.5

Table 3. Sampled Construction Materials and weights

Material	Weights
Cement	12.07
Reinforcement	16.67
Granite	6.52
Sand	3.79
225mm sandcrete block	5.93
22swg longspan aluminum	5.12
Emulsion paint	3.63
Total	**53.73**

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Table 4. Construction Material Prices in Nigeria from 1998 - 2007

Year		Cement per 50kg bag	Reinforcement bar per tonne (High tensile)	Granite per 3.81m³	Sand (sharp) per 3.8m³	225mm sand crate hollow block	22swg long span aluminum roofing sheet	Emulsion pain per 4 litre tin
98		700	35000	9000	2100	36	1479	600
Q1		700	35000	9000	2100	36	1479	637
		700	35000	9000	2100	36	1479	637
Q2		460	35000	9000	2100	36	1479	637
99	Q1	460	32000	10500	2000	38	1450	610
	Q2	460	32000	10500	2500	38	1500	610
	Q3	510	35000	16500	3100	41	1600	615
	Q4	510	35000	16500	3100	42	1600	615
00	Q1	500	32500	16500	3000	39	1700	615
	Q2	520	32500	16500	3500	39	1700	615
	Q3	550	39000	10500	3000	45	1600	450
	Q4	550	39000	10500	3000	45	1600	450
01	Q1	650	31900	6800	3000	45	1600	450
	Q2	650	31900	6800	3000	45	1600	450
	Q3	600	31900	6800	3000	45	1600	450
	Q4	600	31900	6800	3000	45	1600	450
02	Q1	600	31900	6800	3000	45	1600	450
	Q2	600	31900	6800	3000	45	1600	450
	Q3	600	31900	6800	3000	45	1600	450
		600	31900	6800	3000	45	1600	450
03		600	31900	6800	3000	45	1600	450
Q1		760	31900	6800	3500	45	1600	550
	Q2	700	75000	18000	6500	70	1000	550
	Q3	700	75000	18000	6500	70	1000	550
04		700	75000	18000	6500	70	1000	550
Q1		1020	96000	18000	7000	90	1000	550
	Q2	1020	96000	18000	7000	90	1000	550
	Q3	1020	96000	18000	7000	90	1000	550
05		1500	96000	18000	7000	90	1000	550
Q1		1300	96000	18000	7000	90	1000	550
	Q2	1300	96000	18000	7000	90	1000	550
	Q3	1200	96000	18000	7000	90	1000	550
06	Q1	1200	96000	18000	7000	90	1000	550
	Q2	1350	96000	18000	7000	95	1000	550
	Q3	1350	96000	18000	7000	95	1000	550
	Q4	1500	96000	18000	7000	95	1000	550
07		1500	96000	18000	7000	95	1000	550
Q1		1500	96000	18000	7000	95	1000	550
	Q2	1500	96000	18000	7000	95	1000	550
	Q3	1500	96000	18000	7000	95	1000	550

(Source: N.I.Q.S journals, 1998 – 2007)

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Table 5. Weighted Aggregative Mean, Construction Materials Inflation rate
(CMIR) and Trend in Price Movement

Year		Weighted Aggregative mean	CMIR (Previous Quarter as base)	Trend in Price Movement (2002 as Base)
98	Q1	12441.88	_	10.53
	Q2	12444.37	0.02%	10.56
	Q3	12444.37	0.00%	10.56
	Q4	12390.46	-0.43%	10.08
99	Q1	11630.30	-6.14%	3.32
	Q2	11670.33	0.34	3.68
	Q3	13392.93	1.15	18.98
	Q4	13393.04	0.00%	18.98
00	Q1	12617.30	5.79	12.09
	Q2	12654.82	0.29	12.43
	Q3	13897.09	9.82	23.46
	Q4	13897.00	0.00	23.46
01	Q1	11275.38	-18.86	1.71
	Q2	11275.38	0.00	1.71
	Q3	11256.08	1.71	1.00
	Q4	11256.08	0.00	1.00
02	Q1	11256.08	0.00	1.00
	Q2	11256.08	0.00	1.00
	Q3	11256.08	0.00	1.00
	Q4	11256.08	0.00	1.00
03	Q1	11256.08	0.00	1.00
	Q2	11307.69	0.45	0.46
	Q3	26209.30	131.78	132.84
	Q4	26209.30	0.00	132.84
04	Q1	26209.30	0.00	132.84
	Q2	32796.54	25.13	191.36
	Q3	32796.54	0.00	191.36
	Q4	32796.54	0.00	191.36
05	Q1	32941.84	4.43	191.66
	Q2	32896.91	-1.36	192.26
	Q3	32896.91	0.00	192.26
	Q4	32874.45	0.07	191.06
06	Q1	32874.45	0.00	192.06
	Q2	32908.69	0.10	192.36
	Q3	32908.15	0.00	192.36
	Q4	32942.39	0.10	192.66
07	Q1	32942.39	0.00	192.66
	Q2	32942.39	0.00	192.66
	Q3	32942.39	0.00	192.66
	Q4	32942.39	0.00	192.66

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

5. RESULTS AND DISCUSSIONS

The discussions were approached from two ways: firstly, discussions on the descriptive analysis of the study data as shown in figures 1 to 7 as well as the findings garnered, and secondly, based on the inferential analysis of the quantitative data and regression model development, as shown in table 6.

5.1 Descriptive analysis

Figure 1shows the general inflation rate witnessed in Nigerian economy for a ten year period; 1998 to 2007. It can be observed that each quarter for the period experienced its own share of irregular downward and upward movements.
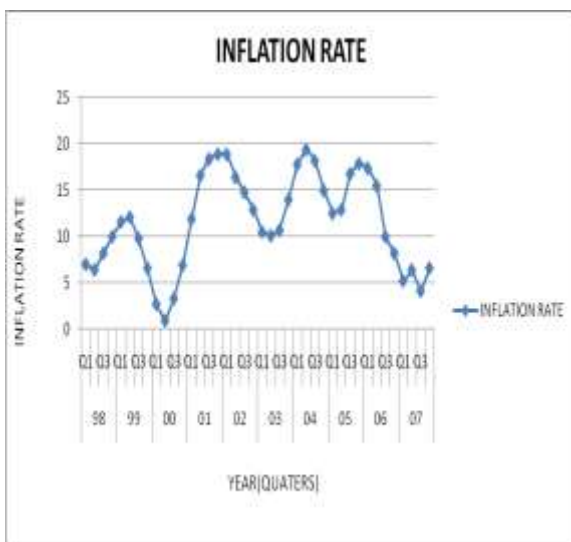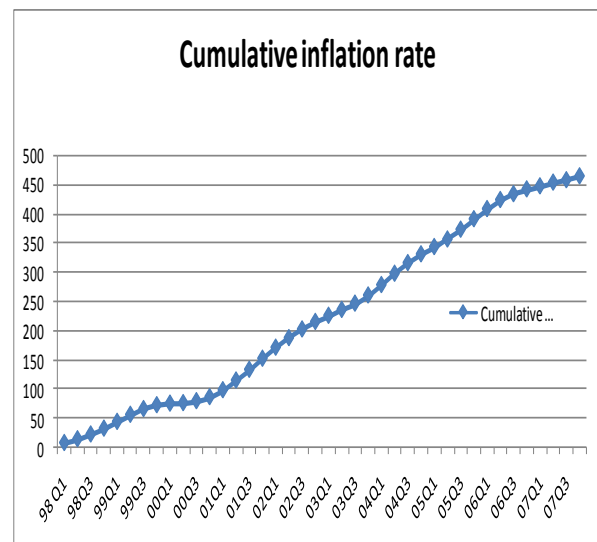
Figure 1. Graph of Inflation rate

Figure2. Graph of Cumulative Inflation rate

It can also be observed that inflation in the Nigerian economy experienced a steady increase. The rate of increase between 1998 and 2001 was relatively small, with sharp increase between 2001 and 2007. The graph of cumulative inflation rate; figure 2 clearly depicts this.
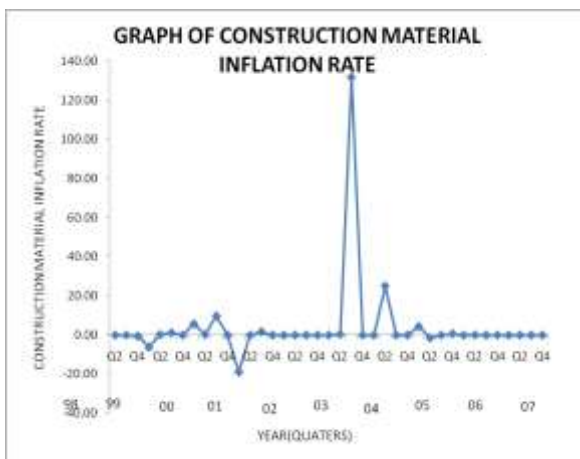
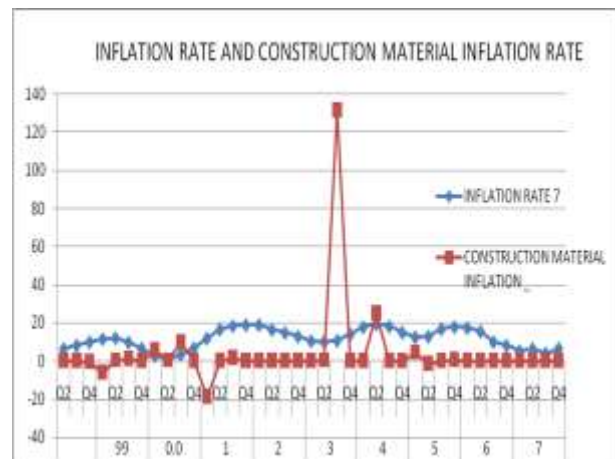**Figure 3.** Graph of Construction Materials Inflation rate

Figure 4. Inflation rate versus Material Inflation rate

PM World *Journal*   *An Assessment of the Impact of Inflation on*
Vol. III, Issue IV – April 2014   *Construction Material Prices in Nigeria*
www.pmworldjournal.net   by Ogun Oghenekevw, Ogusina Olusola,
Featured Paper   Ugochukwu Stanley Chukwudi

A plot of inflation rate of construction materials as indicated in figure 3 shows that there were negative drops between Quarter 4(Q_4) and Quarter 2(Q_2) of 1999 and 2000, Q_4 and Q_2 of 2001 and 2002. Q_2 and Q_2 of 2003 and 2004 experienced a very sharp increase.

In figure 4, where construction materials inflation rate was plotted against general inflation rate it can be observed that construction material inflation rate lagged behind general inflation rate during most of the period, except in Q_2 of 2003, when the sharp increase led general inflation.

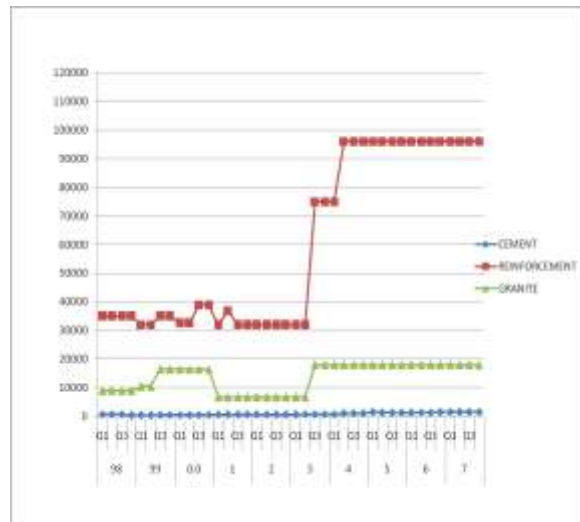**Figure 5.** Graph of general trend in price movement

Figure 6. Graph of Materials' prices movement: Cement, Reinforcement and Granite
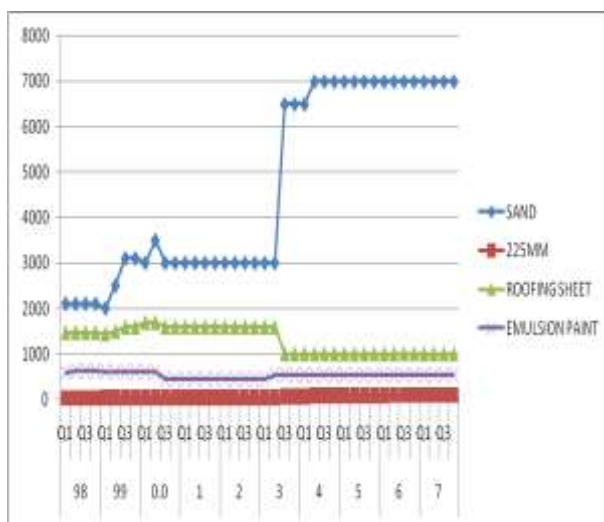

Figure7. Graph of Materials' prices movement: Sandcrete Block, Roofing sheet, Emulsion Paint

As shown in figure 5, the only relative stability in price of construction materials observed, was from Q_1 to Q_2 of 2001 and 2003. Price stability was also observed from Q_2 of 2004 through Q_4 of 2007.

The descriptive analysis of this research has clearly explained that inflation rates in Nigeria have been far from stable. Nigeria has experienced relative stability i.e. creeping inflation over time. 2004 however, witnessed the highest inflation recorded.

Prices have not also moved uniformly. The prices of the various construction materials under study have changed at various degrees over the ten year period as shown in figures 6 and 7. It can thus be inferred that inflation did not affect construction materials prices uniformly.

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Furthermore, inflation is not the only macro-economic variable that affects the prices of construction materials; other variables such as importation, interest rate, Gross Domestic Product (GDP) have been observed to have a significant effect. Various political-economic regimes have also affected the trend in price movement.

5.2 Inferential Analysis

The hypothesis being tested is whether a significant relationship exists between inflation rate and the trend in price movement of building materials. To test the hypothesis which will also promote the achievement of the purpose of the study, the simple regression statistic was applied to data obtained on prices of the construction materials under study.

Table 6. Regression Model Summary for relationship between Cumulative Inflation rate and prices of construction materials. (see next page)

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Material	Result of Experiment					Inference	
	Regression Equation	S	R –Sq	R – Sq(adj)	Pearson correlation(R)	Strength of Relationship	Remark
Cement	$Cement_{price} = 705.4 - 4.089\ CIR + 0.02355\ CIR^2 – 0.000029\ CIR^3$	755.106	88.1%	87.1%	0.918	Strong	S.S
Reinforcement	$Reinforcement_{price} = 49150 – 511.8\ CIR + 3.354\ CIR^2 - 0.004403\ CIR^3.$	29702.38	90.4%	89.6%	0.898	Strong	S.S
Granite	$Granite_{price} = 13733 –74.57\ CIR + 0.4140CIR^2 – 0.000500CIR^3$	3888.85	43.6%	38.9%	0.597	Weak	N.S
Sharp sand	$Sand_{price} = 2663 – 13.17\ CIR + 0.1440CIR^2 – 0.000207\ CIR^3$	755.106	88.1%	87.1%	0.918	Strong	S.S
Sandcrete hollow block	$Block_{price} = 42.06 – 0.1705\ CIR + 0.0001557CIR^2 – 0.00002CIR^3$	6.63024	93.1%	92.5%	0.944	Strong	S.S
22swg longs pan aluminium roofing sheet	$Roofing\ sheet_{price} = 1329 + 7.058\ CIR – 0.04360\ CIR^2 + 0.000059CIR^3$	S = 112.381	86.5%	85.4%	-0.838	Strong	S.S
Emulsion Paint	$Emulsion\ Paint_{price} = 700.3 – 3.161\ CIR + 0.01351\ CIR^2 – 0.000016\ CIR^3$	43.3029	57.75 %,	54.0%	-0.124	Very weak	N.S

(*Source*: Researchers' analysis results, 2009)

KEY: S.S = Statistically Significant

　　　N.S = Not Significant

Table 6 gives the summary of the regression analysis. It is observed that the results for cement, reinforcement, sharp sand and sandcrete hollow block all show goodness of fit and high degree of explanation of the price variability by the cumulative inflation rates of 87.1%, 89.6%, 87.1%, 92.5%. Their degrees of correlation being high positive values of 0.918,

PM World **Journal**
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

0.898, 0.918, 0.944 indicating direct proportionality. It can thus be inferred that cumulative inflation rate can be used to predict the trend in price of cement, reinforcement, sharp sand, sandcrete hollow block cumulative inflation rate has significant relationship with price of cement, and therefore the alternative hypothesis is accepted

Result for granite does not show goodness of fit. The price variability cannot be explained by the cumulative inflation rate of 38.9%. The degree of correlation is a weak positive relationship of 0.597.Thus, it can be inferred that cumulative inflation rate cannot be used to predict the trend in price of granite, since it has no significant relationship with price of granite. The null hypothesis accepted.

The relationship from the experiment on roofing sheet shows goodness of fit and high degree of explanation of the price variability by the cumulative inflation rate of 85.4%. The degree of correlation is negative 0.838, indicating that as cumulative inflation rate increase the price of roofing sheet decrease. It is therefore inferred that cumulative inflation rate can be used to predict the trend in price of long span aluminum roofing sheet. Cumulative inflation has a significant relationship with price of long span aluminum roofing sheet, the alternative hypothesis is thus, accepted.

Unlike the preceding relationships, the relationship indicated in the emulsion paint experiment does not show goodness of fit. The price variability cannot be explained by the cumulative inflation rate of 54.0%. The degree of correlation is negative 1.124, indicating a very weak relationship. It can thus be inferred that cumulative inflation rate cannot be used to predict the trend in price of emulsion paint. The cumulative inflation rate has no significant relationship with price of emulsion paint, and therefore the null hypothesis is accepted.

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the study showed that increase in construction material prices is not only caused by inflation. Other macro-economy factors such as importation, interest rate, Gross Domestic Product (GDP) also contribute to these increases and have an effect on the trend in price movement.

The research also showed that the construction industry inflation is not equal to the economy wide inflation.

Furthermore, the simple polynomial regression analysis has further offered objective explanations of the relationship between cumulative inflation rate and construction material prices and as such the model obtained can also be further developed, by considering various specifications, stationary properties and incorporating error correction mechanisms to provide economic related variable for estimating purposes.

In the light of the findings from the study, the following recommendations are hereby advocated.

(i) There should be systematic reduction in the country importation level as this will in turn encourage the use of locally made building materials. Foreign/imported construction materials allow inflation of other countries to be transferred to Nigeria, thereby resulting in

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

high construction material prices even where there is relative stability in price level in the economy.

ii) The data base for the construction sector in Nigeria should be properly developed, as this will facilitate the development of Construction Material Inflations Rate (CMIR) which will further aid in estimating of future cost of projects and in cost planning.

(iii) The construction material inflation rate (CMIR) for the Nigerian construction industry using the average weighted aggregative price index (AWAPI) formula should be developed. The CMIR will be a better basis for the calculation of fluctuation in prices of construction materials.

iv) Professionals of the built environment should be involved in policy making, as Government policies can also cause increases in price level of construction materials.

REFERENCES

Ashworth, A. (1983). *Building economics and cost control worked solutions*. London: Butterworths.

Ajanlekoko, J.O. (1990). The rise in cost of building materials and the structural adjustment programme: How Appropriate? *The Quantity Surveyor ,6* (1), 13- 17.

Akuwusola, W.A.O. (2007) Effect of Economic trade cycle on final cost of Construction Projects in Nigeria. *NIQS Quarterly Journal, 55* (2),7 – 12.

Annuobi, A.I. (1997). Construction in the context of the National Economy. *Journal of the Association of Architectural Educators in Nigeria,* 1(4),15 – 19.

Anyanwu, J.C. (1993). *Monetary Economics Theory, Policy and Institutions.* Onitsha: Hybrid.

Central Bank of Nigeria. (1996). Inflation in Nigeria. *Central Bank of Nigeria Briefs, Research Department Series* No 96/11. Abuja: Nigeria. Government Printing Office.

Central Bank of Nigeria. (1996). *Statistical bulletin , vols. 12 and 13*.Abuja: Nigeria. Government Printing Office.

Central Bank of Nigeria. (2002). *The changing structure of the Nigerian economy and implication for development.* Abuja: Nigeria. *Research department.*

Curwen, P.J. (1976). *Inflation*. London: Macmillan Press Ltd.

Eze, J.I., Obiegbu, M.E., & Jude-Eze, E.N. (2005). *Statistics and Quantitative method for Construction and Business Managers*. Awka: Nigerian Institute of Building.

Fakiyesi, O.M. (1996). Further Empirical analysis of Inflation in Nigeria. *CBN Economic and Financial Review*, *34*(1), 489-500.

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Hillebrandt, P.M. (1974). Economic Theory and the Construction Industry. *A Journal of the Federation of Building and Civil Engineering Contractors in Nigeria, 6*(1),23- 27.

Iyoha, M.A., Oyofusi, S.A., & Oriakhi, D.E., (2003). *An Introduction to modern macroeconomics*. Benin City: Mindx Publishing.

Johnson, H.G. (1973). *Further essays in monetary Economics*, London: George-Allen and Unwin.

Jhingan, M.L. (2006). *Economics of planning and development*. India: Vrinda Publications (P) Ltd.

Kaming, P.F., Olomolaiye, P.O., Holt, G.D., & Harris, F. (1997). Factors influencing construction time and cost overruns on Highrise projects in Indonesia. Retrieved from http://ideas.repex.org/a/taf/commgt/v15y1997i/p83-94.html

Melberg, H.O. (1992). *Inflation*: An overview of theories and Solutions. Retrieved from http//www.geocitieces.com/hme/berg/papers/921201.htm.

Monye-Emina, A. I. (2007). Determinants of inflation in Nigeria: Empirical Evidence from the estimation of an error-correction model. *Journal of Economic Studies, 6*(1),7-10.

Nwachukwu, G.O. (2004). The Impact of Materials Management on Projects Profitability and Corporate survival. *NIQS Quarterly Journal, 47*(6), 12 – 14.

Nwuba , C.C. (2004). An analysis of housing construction costs Trends in Nigeria (1986-2002). *NIQS Quarterly Journal*, *47* (6), 19 -21.

National Bureau of Statistics [NBS].(2007). *Statistical Bulletin, Vol. 17*. Abuja: Nigeria. Government Printing Office.

Nwuba, C.C. & Adeagbo, D.O. (2007). The relationship between housing construction costs and house rents trends in Kaduna, Nigeria: *NIQS Quarterly Journal, 55* (2), 14 - 17

Obiegbu, M.E. (2003). *Effective project delivery in Nigerian Construction Industry*: *Effective building procurement and delivery in Nigerian Construction Industry.* Anambra: Rex Charles and Patrick Ltd.

Okike, E.E. (2004). *The effects of Inflation on contractor's operations and profitabilit*y. M. Sc. Dissertation, Department of Building, Nnamdi Azikiwe University, Awka.

Oliver, O. (2005). Appraisal of conventional contract procurement and management systems and the informal economy's Clients. *A paper presented at NIQS workshop Enugu Chapter, December 22-25.*

Onashile, O. (2008, June 11). Construction costs have increased by over 30% in Nigeria. *Vanguard.* Retrieved from http://www.vanguardngr.com/content/view/21943/143/.

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

Onyechi, A. I. (1990). Valuation of prices Fluctuations on Nigeria Contracts. *NIQS Quarterly Journal*, 8(1), 9-11.

Oyediran, S.O. (2006). Modeling inflation dynamics in the Construction sector of a Developing Economy. *A paper Presented in shaping the change xxiiifig congress Munich, Germany, October 8-13.*

Ramus, J.N. (1981). *Contract Practice for Quantity Surveyors.*   London: William Heinemann.

Wahab, K.A. (1985). *Proceedings from the seminar on Coping with Inflation in the Nigerian Construction Industry*. Abuja: Nigeria.

Wikipedia, the Free Encyclopedia. (n.d). *Inflation*. Retrieved from
http://en.wikipedia.org/wiki/inflation

PM World Journal
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola, Ugochukwu Stanley Chukwudi

About the Authors

Ogun Oghenekevwe

Delta State, Nigeria

Ogun Oghenekevwe graduated with a second class (upper division) degree in Quantity Surveying from Nnamdi Azikiwe University, Awka, Nigeria. He works presently with GLO Nigeria (Globacom Nigeria PLC) as a sales executive, involved in identification and activation of new Globacom communication outlets. However, he has a very keen interest in construction quantification and estimating. He is currently undergoing his Masters degree programme in Construction Management in the Nnamdi Azikiwe University. E-mails: ogun.oghenekevwe@gmail.com; ogun_oghenekevwe@yahoo.com

Ogunsina Olusola

Anambra State, Nigeria

Ogunsina Olusola is a project professional with interests in project governance and pricing of capital construction projects. He is a member of the association for the Advancement of Cost Engineering (AACEI) and the Nigerian Institute of Quantity Surveyors (NIQS). Affiliation: Department of Quantity Surveying, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. E-mail: sola_ogunsina@yahoo.com

Ugochukwu Stanley Chukwudi

Anambra State, Nigeria

Stanley Oguchukwu is a committed professional with vast

PM World *Journal*
Vol. III, Issue IV – April 2014
www.pmworldjournal.net
Featured Paper

An Assessment of the Impact of Inflation on
Construction Material Prices in Nigeria
by Ogun Oghenekevw, Ogusina Olusola,
Ugochukwu Stanley Chukwudi

field and consultancy experience on building, estate development and civil engineering projects where he has been able to save clients millions of Naira arising from exorbitant claims. His research interests are in construction cost management, construction economics and infrastructure budgeting. As an academic, he has an unquenchable thirst to make a difference and add value to the profession   He graduated as the overall best student in Quantity Surveying, Nnamdi Azikiwe University at the B.sc level, and repeated same in his M.sc programme in construction management, University of Jos, Nigeria. He is presently pursuing a PhD programme and is a registered member of the Nigerian Institute of Quantity Surveyors. Affiliation: Department of Quantity Surveying, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria. E-mails: sc.ugochukwu@unizik.edu.ng; sc.ugochukwu@yahoo.com