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IMPACT OF MICRO ECONOMICINDICATORS ON THE CONSTRUCTION INDUSTRY IN NIGERIA

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Abstract
Economic indicators are key components of any economic entity; the implication of this is that they are litmus tests for knowing the health of the industries that make up the economy with emphasis on key industries like the construction industry. The Construction industry's share of the Gross Domestic Product (CGDP) aggregates from the Gross Domestic Product (GDP). The CGDP and inflation are both economic indicators with micro index that is stored and catalogued as secondary data by the CBN and NBS. Previous studies failed to show the impact of inflation on the CGDP. A regression model was built to show if this relationship exists for a time frame of 40 years. The model yielded 0.95 (95%) while a corresponding regression model yielded 95% in the positive direction. The study concluded that government agencies like the Ministry of Budget and Finance should make macroeconomic policies that will impact microeconomic indicators like inflation on the CGDP in the long run.

Keywords: Construction industry, gross domestic product, inflation, micro, economic, indicators, regression, correlation

Introduction

The concept of economic indicators globally has always been the yardstick to measure growth and development in any economic system. The United States (US) so happens to be the forerunner of this concept and the foremost promoter of economic theories that emerged from the procedure and process of economic indicators in both the public and private sector domain. Infrastructure development has always been identified as critical to the achievement of national development goals, which can't exist without macroeconomic policies (African Development Bank Group (ADBG) 2012). Ojo (2019) and Smith (1989) believe that microeconomic indicators such as inflation gross domestic product (per capita), public deficits, unemployment rating index, inflation and foreign exchange rate (FOREX) also impact the economy and the industries that support that economy. Inflation stands central in economic governance, appropriation, and foreign policy (CBN, 2020). Policy-makers use them to assess the economic health of that nation's sectoral economic performance like that of the construction industry. Professionals such as economist and construction industry practitioners like quantity surveyors evaluate the performance of the construction industry (CGDP), using them as yardsticks to measure development and causative influence (Charles, 2018). Loughborough (2020) believes that inflation definition while models for studying have varied across countries over time. Particular choices can be made for selecting inflation as an indicator to be studied with fundamental distributive consequences. Studying inflation is vital and answers question why we measure the economy and by extension the construction industry the way we do. Inflation trends are embedded in contemporary social and political life (The Economist, 2006). The vastness of

economic data has profound influence on the construction industry. A viable and potent indicator like the Consumer Price measures inflation which aggregates to a general output measurable by an indicator. It can also be determined by the implicit deflator of the Gross National Income (GNI) according to Mayers (2005).

Background to the Study

The World Trade Report (2004) opined that inflation determines the time value of money, lending rates or interest rates occasioned among banks and determined by the CBN appropriates directly to the profitability and rate of return incurred on any construction activity. Inflation the price of money per time, not its value. They link large stocks of physical and financial assets with smaller flows of savings and investment; connect the present and the future and are sensitive to economic expectation. As a result, they are very volatile and hard to predict except when examined as time series data. Oxford Economics (2020) observed that countries in sub-Saharan Africa like Nigeria can't be termed developing nations because of the level of developmental stagnation that such nations are encountering, caused chiefly by difficulty in doing business, occasioned by runaway inflation for construction work and other allied business against that of developed nation which puts inflation at 4-6.5%. This it was opined according to Ojo (2019) impacted negatively on the construction industry, measured by the CGDP. it failed in its opinion to measure and present the impact of inflation on the CGDP through its time series data and the expected average inflation rate prevailing in Nigeria for 40 years as recommended by Babatunde (2018). These statements affirm the need to investigate the impact of inflation on the construction industry and the average time series inflation trend in Nigeria for 40 years.

Objectives of the Study

From the statements above the objectives of the study are formulated thus:

i. To investigate the effect of inflation on the construction industry in Nigeria.
ii. To determine the average time series inflation trend in Nigeria for 40 years.

Materials and Methods

Time series economic data of 40 years for inflation and the construction industry quota of the GDP (CGDP), is a microeconomic indicator presented by policymakers like the Federal Ministry of Budget and National Planning (FMBNP), Federal Ministry of Finance (FMF) and the Central Bank of Nigeria (CBN). These agencies provide an ample secondary database of 40 years' economic time series data, these being qualitative. The nature which Causal research studies have shown can establish a relationship between two or more entities such as the impact of inflation and the CGDP (Babatunde, 2018; Santosh (2016)). The characteristics and analysis of these secondary time series data collected from the repository of the CBN and NBS for 40 years are a veritable source of information. These validated secondary data were subjected to statistical analysis such as mean score, regression and correlation. Descriptive statistics such as frequency tables and charts used to aid the presentation.

Time Series Econometric Data

The data presented are time series econometric data sets from the repository of the CBN and NBS for a time series of 40 years, these have been collated and sorted to reflect only the relevant information on the yearly values of the construction industry quota of the GDP (CGDP) and the inflation rates for 40 years. These are presented thus.

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Mean item score

Asika (2005) agrees the mean item score is a veritable tool in data study and analysis. They provided for the following procedure which will be used in the study of inflation and CGDP. The standard practice in calculating the mean of a time series data consists of adding item scores and standardizing these sums. These will consist of the following procedures; making corrections for the variance that disturbs the structure of the questionnaire; and establishing reliable scale scores via a scaling system that presents the qualitative attributes of items scored this can be mathematically represented thus.

$$MS = \frac{5n5 + 4n4 + 3n3 + 2n2 + 1n1}{5n5 + 4n4 + 3n3 + 2n2 + 1n1}$$

Source: Source: Pallant (2011)

Correlation Model

The purpose of correlation analysis is to measure and interpret the strength of a linear or nonlinear relationship between two continuous variables such inflation and the CGDP. When conducting correlation model the term linear association focus on the Pearson (p) and Spearman (p) correlation coefficients. Both correlation coefficients take on values between -1 and +1 all ranging from being negatively correlated to uncorrelated (0) to positively correlated (1). The sign of the correlation coefficient (positive or negative) defines the direction of the relationship. The absolute value indicates the strength of the correlation. The Pearson correlation coefficient is also known as the sample correlation coefficient (r) and product-moment correlation.

$$r = \frac{n(\sum xy) - (\sum x)(\sum y}{\sqrt{[n\sum n2 - (\sum x)2][n\sum y2 - (\sum^{y)2]}}}$$

Source: Pallant (2011)

Table1: Correlation Modeling

Strong (+) relationship		weak		strong negative sign (-)
+1	+0.5	0	-0.5	-1.0

Pallant (2011)

Regression Modeling of CGDP and Inflation

Pallant (2011) opined that a simple regression model or analysis contains only one independent (explanatory) variable while multiple regression is not just one technique but a family of techniques that can be used to explore the relationship between one continuous dependent variable such as CGDP and several independent variables or predictors such as inflation (usually continuous). According to Pallant (2011), multiple regression is based on correlation model type, but allows a more sophisticated exploration of the interrelationship among a set of variables this is expressed.

$$Y = a + bX + E$$

Source: Pallant (2011)

Where a = $\frac{N\sum xy - (\sum x)(\sum y)}{N\sum x2 - (\sum^{x)2}}$

Where b = $\frac{\sum y - b\sum x}{N}$

Source: Pallant (2011)

This makes it ideal for the investigation of my study which is real-life (TIME SERIES DATA), rather than experimental-based, research questions. Multiple regression can be used to address a variety of research questions. It can tell you how well a set of

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variables predict a particular outcome. In standard multiple regression, all the independent variable(s) (CGDP) entered into the equation simultaneously against the dependent variables such asinflation and interest (Oladipo & Oni, 2012). Each independent variable is evaluated in terms of its predictive power, over and above that offered by all the other independent variables. This approach would also tell me the unique variance in the dependent variable each of the independent variables explained and makes it essential in understanding the impact of economic indicators on the construction industry in Nigeria.

Results and Discussion

Having analyzed the time series data presented for CGDP and inflation for 40 years the results are presented and discussed thus.

The construction industry share of the CGDP at current basic price

The CGDP figures from NBS and the CBN are interesting to find in their presentation. The average CGDP value stands at 1,413.13. The highest value of the CGDP recorded was 1,639.48 in 2020. Followed by 8,996,48. It was 4,281.78 in 2017. 3,606.56 in 2016. 3,472.26 in 2015, 3,188.82 in 2014. 2,676.28 in 2013. 2,188.72 in 2012. 1.905.5 in 2011. 1,570.97 in 2010. 1,283.47 in 2019. 1,131.72 in 2008. It dropped to 983.63in 2007. 924.08 in 2006. 796.56 in 2005. 613.07 in 2004. 217.44 in 2003. 177.13 in 2002. 150.40 in 2001 and the year 2000 it became 112.97. 1999 recorded 101.62, 91.83. 1998, 69.31 in 1997, 59.22. 1996 recorded 50.88. 1995, 39.11 in 1994. 29.60 in 1993. 22.55 in 1992. 18.09 in 1991. 16.06 in 1990. 14.23 in 1989. 9.11 in 1998. 8.03 in 1987. 7.09 in 1986. 5.66 in 1985. 7.04 in 1984. 8.33 in 1982 and finally to 10.24 in 1981.

Table 2: A 40-year CGDP of the construction industry

S/N	DATE	CGDP	S/N	DATE	CGDP	S/N	DATE	CGDP
1	1981	10.24	15	1995	50.88	28	2008	1,131.72
2	1982	9.18	16	1996	59.22	29	2009	1,283.47
3	1983	8.33	17	1997	69.31	30	2010	1,570.97
4	1984	7.04	18	1998	91.83	31	2011	1,905.57
5	1985	5.66	19	1999	101.62	32	2012	2,188.72
6	1986	7.09	20	2000	112.97	33	2013	2,676.28
7	1987	8.03	21	2001	150.40	34	2014	3,188.82
8	1988	9.11	22	2002	177.13	35	2015	3,472.26
9	1989	14.23	23	2003	217.44	36	2016	3,606.56
10	1990	16.06	24	2004	613.07	37	2017	4,281.78
11	1991	18.09	25	2005	796.56	39	2018	6,031.06
12	1992	22.55	26	2006	924.08	39	2019	8,996.90
13	1993	29.60	27	2007	983.63	40	2020	11,639.48
14	1994	39.11					Average	1413.13

The value of the average nominal CGDP is thus put at 1,413.13 billion Naira based on the CBN database. This can be deflated to real CGDP in US dollars thus (1413.13/0.0075)/550.This yields 345 million Dollars

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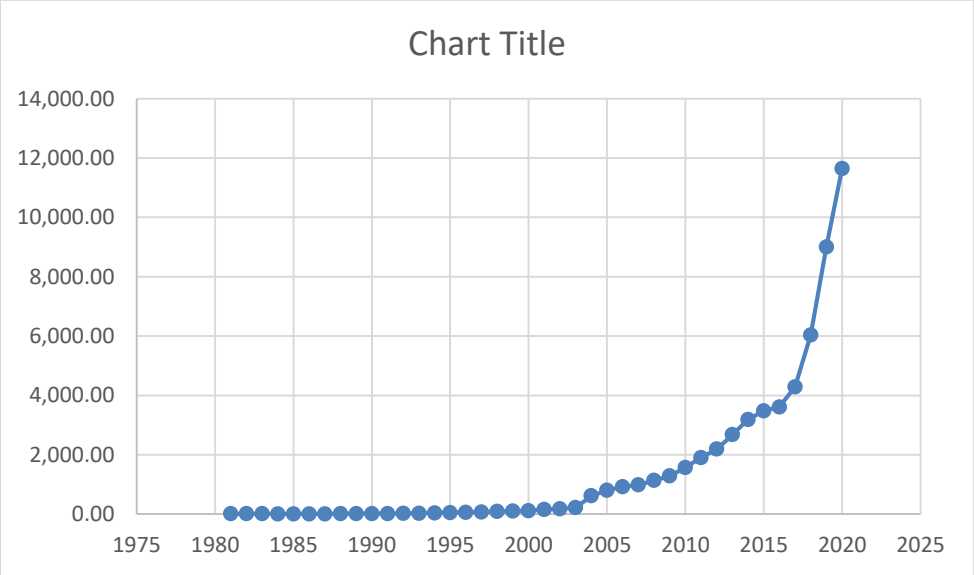


Figure 1: CGDP trend from 1981-2020
Source: NBS (2020) and CBN (2020)

The trend of inflation in Nigeria for 40 years

The inflation rate was obtained from the discounted consumer price index, the CBN trend study of inflation in Nigeria indicates a value of 333.04% percent in 2020 with a recorded CGDP of 11,640.48, these signifies the highest according to the CBN and NBS report. The lowest value was in 1981 at a record low of 0.45% with a recorded CGDP value of 10.24. The average of the inflation rate is recorded as 75.34% for the years of 1981 to 2020. The second highest figure is 292.04% recorded in 2019 with a corresponding 8,996.90 CGDP. The inflation rates for 1983 to 1993 stood steady at an adjusted rate of 9.28% due to the non-availability of data, the computed figure of 9.28% was obtained as the average of the inflation of the year 1981 which is 0.45% and 1995 which is 17.66%. This is seen in the graphical trend analysis as a plateau for the years presented. The inflation rate then rose to 22.58% in 1996 with a CBDP of 59.22 and started a steady climb to 25.32% in 1997.

Table 3: Inflation rate trend from 1981 to 2020

	DATE	INFLATION		DATE	INFLATION		DATE	INFLATION
1	1981	0.45	14	1994	9.28	27	2007	75.40
2	1982	9.28	15	1995	17.66	28	2008	84.36
3	1983	9.28	16	1996	22.58	29	2009	96.15
4	1984	9.28	17	1997	25.32	30	2010	108.68
5	1985	9.28	18	1998	27.96	31	2011	120.78
6	1986	9.28	19	1999	29.88	32	2012	135.63
7	1987	9.28	20	2000	31.66	33	2013	147.12
8	1988	9.28	21	2001	37.05	34	2014	158.83
9	1989	9.28	22	2002	42.66	35	2015	172.96
10	1990	9.28	23	2003	50.10	36	2016	197.63
11	1991	9.28	24	2004	57.93	37	2017	231.05
12	1992	9.28	25	2005	64.15	40	2018	261.46

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13	1993	9.28	26	2006	70.29	40	2019	292.04
						40	2020	333.04
							Average	75.34

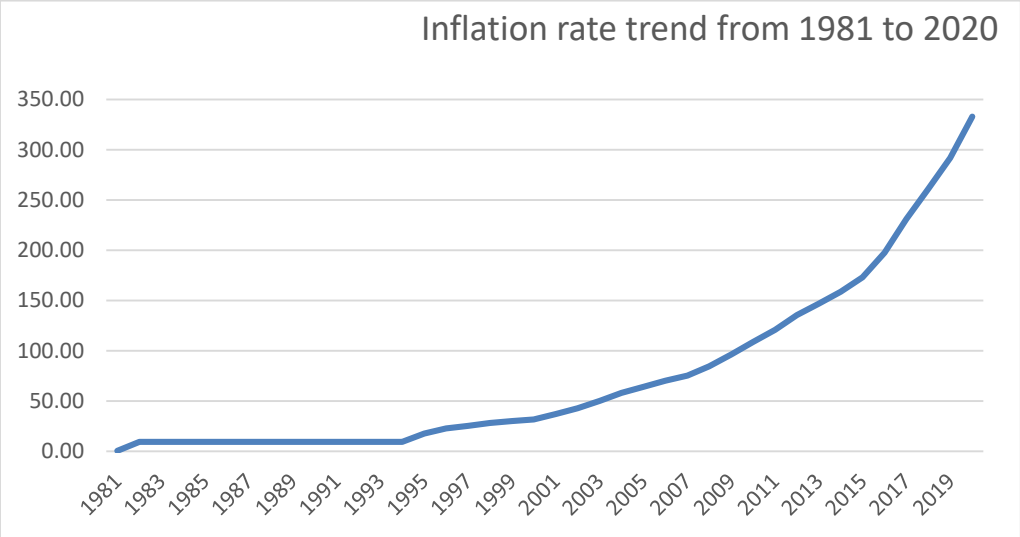


Figure 2: inflation trend from 1981-2020
Source: NBS (2020) and CBN (2020)

Inflation rate trend from 1981 to 2020, with an average figure of 75.34% peaking at a hyper rate of 333.40% in 2020.

Regression Model of CGDP and Inflation

The regression model built is based on the basic relationship between X (CGDP) and Y(inflation)the output of that regressed model is expressed thus. The Multiple regression model shows a strong association of 0.95214 or 95% based on the model built with MS Excel. The maximum limit for the regression model is 1.0 or 100%. The R (residual) square value gives a yield of 0.90658 or 91%, again the maximum value for this is 1.0 or 100%. When this value is adjusted to get a concise value, it gives an output of 0.90405 or 90% with a maximum regression adjusted R value of 1.0 or 100%. The number of years analysed or observed is placed as 40 years from 1981 to 2020.

Table 4: Regression model of CGDP and inflation and the ANOVA output table
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.95214
R Square	0.90658
Adjusted R Square	0.90405

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Standard Error	791.996
Observations	40

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	225217197	225217197	359.05	1.22579E-20
Residual	37	23208556.55	627258.29		
Total	40	248425753.6			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-699.3	170.113406	-4.110768	0.0002
0.45	27.8087	1.467585407	18.948619	1E-20

Lower 95%	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
-1043.97933	-354.61	-1043.97933	-354.6143
24.83510656	30.7823	24.83510656	30.782328

$Y = a + bX + Z.$

Expressed as Y= -699.3+ 0.90405+791.99

The model built is thus if Y = CGDP, CGDP is 0.95% or 95%.

Correlation Model of CGDP and Inflation

The correlation model built with Ms Excel shows a positive direction of the intercept of the model built, the relationship exhibited by the Spearman's *r* value is placed as 0.95 0r 95%with a maximum regression adjusted *r* value of 1.0 or 100%.

Table 5: The correlation Model of CGDP and inflation

Correlation Model of CGDP VS inflation	
Spearman's rank Correlation output	0.95156486
r value 0.95	
Direction	+

$$r = \frac{n(\sum xy) - (\sum x)(\sum y}{\sqrt{[n\sum n2 - (\sum x)2][n\sum y2 - (\sum y)2]}}$$

r value = 0.95

Pallant (2011)

DISCUSION OF FINDINGS

The inflation rate trend in Nigeria

The inflation rate trend in Nigeria is revealing and asserts the position of happenings in the construction industry for 40 years, it averages a double-digit value of 75.34% which according to the Economist is termed hyperinflation. The CBN has also on occasion over the past 40 year waded into this macro trend by controlling the amount of money in circulation via its macroeconomic role as the regulator of the economy that hyperinflation recorded in the financial sector of the economy is responsible for the high rate of construction project abandonment in Nigeria. Construction projects are not purchased off the shelf as posited by Seeley (2005) but derive from economic goods, The final accounts procedure as taking into stock the whole economic activities on site but with increased hype inflation, it becomes difficult to complete construction projects hence the increased rate of construction project abandonment trend in Nigeria.

The Impact of Inflation on the Construction Industry in Nigeria

Pieces of literature have established that inflation is a microeconomic indicator (Ojo, 2019) the impact that it has on the CGDP was measured with a correlation model which shows a relationship exists. The study shows a relationship of 95% which is high. Further, the correlation model used was built on nominal CGDP from the CBN data set based on NBS template. The CGDP has not been reduced to real CGDP via discounting of the inflation rate (The Economist, 2006) and thus the correlation model built is adequate to show the current rate of the strength of the relationship between CGDP and inflation.

The existence of that relationship led to determining how strong that relationship is, this led to a regression model with a strength of 95%. This strength was recorded for a time series of 40 years in the construction industry. This is reflected in the high rate of building materials and why construction materials in Nigeria are constantly on the increase (Charles, 2018). A case to note is the price of cement which is ever increasing yearly. This increase in economic terms is called inflation and has multiplier effect on the construction industry. The KPMG (2020) report on the state of the construction industry in sub-Saharan Africa tend to lend credence to the fact that microeconomic outcome like inflation are directly correlated to rising price, unemployment, and reduction in the value of the local currency.

Conclusion and Recommendations

The construction industry is a dynamic one that impacts positively on the GDP of Nigerian Economic indicators are a good yardstick to measure how it fares either positively or negatively. The inflation trend in Nigeria is not a favourable one to the construction industry due to the trend of the time series data discovered by the study which a previous study by the KPMG (2020) indicates to be unhealthy for the construction industry CGDP. Continental giants in Africa and growing economies the world over have a construction sector CGDP to the tune of billions of dollars. The recorded adjusted CGDP of 345million Dollars is small based on global prerequisite for CGDP required to spur economic growth according to the KPMG (2020) index for CGDP growth in sub-Saharan Africa.

The study having considered the impact of the microeconomic indicators also revealed that a strong relationship exists between the rate of inflation in the construction industry. This relationship justifies the contraction in the growth of the industry for the time series of 40 years that was examined and shows that a reduced CGDP

(345 million dollars to 5.4 billion dollars of developing economies) can be attributed to an increased trend in the inflation rate as supported by the study.

The following recommendations were made in line with the findings of the study:

1. Macro and microeconomic policies have profound influence on the construction industry. While micro policies are often the by-products of Macro policy. The policymakers for Government on macro policies are; Federal Ministry of Finance (FMF) and the Central Bank of Nigeria (CBN). These agencies should make interest policies that will help lower the rate of inflation in country.
2. The Federal Ministry of Budget and National Planning (FMBNP) which is the chief government planer should allow and encourage investment in the construction industry by dedicating 6-10% reinvestment of the nation's GDP into the construction industry.
3. These government agencies should also shore up the CGDP by promoting policies like high import duties and increased tax policies for multinationals in the construction industry that are active players in the construction industry. These steps will further reduce the national income of these countries and increase the nation's GDP via its CGDP.

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