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MACRO-ECONOMIC VARIABLE AND PRICES OF SOME SELECTED BUILDING CONSTRUCTION MATERIALS IN NIGERIA (1987-1996)

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ABSTRACT *In this study, an attempt was made to examine the possibilities of using macroeconomic variables such as Gross Domestic Product (GDP) to predict the likely cost of building materials. Field and published data were obtained for price trends of selected building materials and building /construction component of the GDP respectively for the period 1987 - 1996. Field data on the selected materials were obtained from six different zones of the country and the results were adequately weighted statistically. Using simple Regression Analysis as a statistical instrument, the Percentage changes in the GDP (as contributed by Building and Construction Sector) versus percentage changes in weighted annual prices of various materials were studied. The results showed a significant relationship, with a coefficient of determination (R-square) value of 96.34% and a confidence limit of 0.0293. The study concluded that there is a strong statistical relationship between percentage changes in GDP (as contributed by the Building/Construction Sector) and the percentage changes in the prices of some selected construction components.*

INTRODUCTION

The promotion of economic growth is one of the major goals of any government. This occurs when the amount, which can be produced and consumed per head of the population, increases. This can be measured by the nation's Gross Domestic Product, which is the sum of final products including consumption goods, gross investment, gross birth and production of buildings. Hence, the production of buildings could be seen as one of the components for the computation of the Gross Domestic Product of a country. Whatever affects the building industries invariably affect the G.D.P. The production of buildings is one of the most important activities in any economy. This is evidenced from the fact that large part of the national resources is usually applied to the construction and maintenance of existing stock of buildings.

However, there is a need to use the country's construction resources namely, material, labour, capital and plant to best advantage. This fact, coupled with the growing need for more accommodation by both private and public sectors and the call by government for disciplined cost planning of public projects had created the awareness in building professionals and developers to call for better ways of managing construction resources which involve materials, labour, plant and money.

Due to dwindling economic resources and limitation to available resources, it becomes imperative to continually predict demand, prices of building materials and labour rates with the aim of formulating such predictions into terms that allow resources to be accessed.

Gross Domestic Product And It's Characteristics

Lipsey (1989) defined Gross Domestic Product as the value of total output actually produced in the whole economy over some period usually a year. The GDP output is measured by computing the income generated in producing it, as well as the expenditure needed to produce it. There are three approaches employed in measuring or calculating the Gross Domestic Product of a nation, namely income, output and expenditure approaches.

Adebo-Lawal (1982), Harvey (1985) and Ojo (1995) submitted that the use of the value of GDP, to some extent would be limited, if prices change constantly within a period of time. For instance, if the GDP has risen by 10% between year one and year two, and the prices of materials or price level for the same period have risen by 10%, the volume of production is the same for both periods yet no appreciable increase in output has occurred. Thus the GDP at current factors cost cannot be a reliable basis for comparison between two or more periods. Consequently, the correction is made with the aid of index number or GDP deflator. Thus the GDP can be measured at constant price, eliminating the effect of changes in prices.

The calculation of the contribution of building and civil works to the GDP is not total while building and civil works on site are calculated to the total output, excluding construction work especially maintenance works carried out by other industries. Also, the manufacture of building components and materials, such as bricks, cement, timber, doors and windows, come under manufacturing, and quarrying gravel and sand under mining and quarrying. Therefore it means that the contribution of the construction industry to GDP is the value used added to the inputs of materials and services from other industries.

Government Policies And Price Regulation.

It is the responsibility of government to control the level of economic activities. In doing so, government has to take a number of measures, the objectives of which could be to control the level of unemployment, enhance the standard of living of the people and maintain the value of national currency.

Michael and Brain (1992) explained that government intervenes in the process of economic development for many reasons, but the level of intervention varies between different types of economic system and sectors of the economy. He however, added that government policy affects the level of economic activity both directly and indirectly affects factors of change e.g labour cost relation, transport cost-by deregulation, and the organisation of business-by merger policy.

Jagboro (1995) supported the view, by saying that the economic policy of the government determines the degree and confidence of other industries in the country to invest in future development and expansion. By ensuring a balanced and stable economy there should be a consistent need for new building works, and expansion of the facilities of industries. Government relies mostly on the monetary and fiscal policies to gain control over the economic activities.

The Effects of Deregulation And Inflation on Prices.

Olabopo (1992) explained deregulation economy to mean an economy free from of any form of intervention. It is the market forces that allocate and distribute resources. It is a situation

whereby the law of supply and demand reigns supreme. According to him, Nigeria, with its deregulated economy allows the forces of supply and demand to allocate and distribute resources.

This, he said might have some repercussion on building materials and other consumable goods since the nation depends on the importation of both capital and consumer goods.

Some construction materials are imported either as finished or partially finished products or the raw materials for their production are imported or where the materials are entirely local, the mode of production and transportation has some foreign inputs. With deregulated interest rate and the Central Bank of Nigeria foreign exchange reform of 1992 which led to massive devaluation of the naira, cost of borrowing went up to as much as 30%. Manufacturers and dealers of building materials had to import spare parts to maintain existing plant or procurement of some essential raw material at the deregulated rate of foreign exchange. All these tend to raise the prices of such local construction materials.

In his observation, Olabopo (1992) noted that the rate at which prices of construction materials are increasing arbitrarily on daily basis is as a result of the combined effects of high interest rate, massive devaluation of the naira, inflation, and the defective distribution network of the materials. All these severally or individually work against any hope of provision of shelter for the generality of Nigerians as well as the possibility of being able to provide infrastructural facilities necessary for our industrial take-off which would have helped to elevate us from the rank of a developing to a developed nation.

Mezue (1992) attributed the causes of fluctuation to the frequent changes in Government policies and to some extent on the market trend. Government policies such as the minimum wage and salary elongation of 1981 and 1988 respectively, the foreign exchange reforms of 1992 and legislation on purchase or import duty of the military administration of the late eighties have affected the cost of labour and materials. In his assertions, the increase in the cost of labour and material for the period between 1983 to 1991 is put at 476.78% of the contract sum.

Chizea (1993) believes that price stability is a fundamental goal of monetary policy and the use of indirect monetary tools to achieve macro- economic stability has a high probability of success, provided the exchange rates and interest rates do not deviate from desirable levels. He sees inflation as a fact of life in any economy and that what is worrisome is when inflation goes beyond a level considered to be consistent with the continued growth and development of the economy. The usual cause of inflation is when monetary growth in the economy is not accompanied by commensurate productivity. Other factors include increases in factor costs consequent upon the introduction of the Structural Adjustment Programme and the adoption of market forces for the determination of relative prices in the economy and particularly the excess liquidity in the economy often traceable to lack of fiscal discipline.

In his further submission, Chizea (1993) notes that inflation alters relative prices and therefore affects various economic groups differently. For instance, the low or middle class is often more affected during inflationary periods, than their top most counterparts. The reason for this assumption is obvious. In periods

of inflation, price increases are usually ahead of wage rises except where a wage / inflation indexation has been established. He however suggested that, increased productivity will go a long way to check inflation and that the promotion of the non-oil exports, the implementation of the Liquefied Natural Gas Project etc. would all facilitate the transition to the point in time when the management of the economy would no longer be dominated with developments in the exchange rates.

Building Construction Materials

The construction of a building involves the use of materials, both raw and processed materials. The composition and types of building materials vary from one project to another.

Olaseni (1992) asserted that building materials and components constitute between fifty and sixty percent (50% and 60%) of total cost of construction input. According to him, building materials encompass items used in the construction of a structure from the foundation stage to the installation of fixtures and fittings. Thus earthwork, cement reinforcement, roofing materials, woodwork, metal work, glasswork, finishings (tiles and painting) and fittings (water closet, wash hand basin bath shower tray) constitute major components of building construction both in quantity and cost. Sidney et.al (1980), Butter (1982) and Oguneye (1991) submitted that a great variety of substance is used for building materials, ranging from palm leaves, skins and mud to grass, wood and stone. Many building products are strictly local in origin and are unprocessed; and that the use of building materials is almost as ubiquitous as is the use of food. As highlighted, the use of some building materials such as cement and brick is wide. Both materials are market oriented because they have relatively low unit value and costs of shipping them are high. Cement for instance is the most versatile and the most widely used of all construction materials and is produced on a commercial basis. Apart from cement and brick, larger quantities of other types of materials are used in the process of construction.

Pricing of the Resource Components

Stanton (1986) defined price as the amount of money that is needed to acquire some combination of a product and its accompanying services. The determination of price of material or goods produced is achieved prior to the decision on pricing objectives. These objectives are: (i) Achievement of target return on investment or net sale (ii) Stabilise prices (iii) Maintain or improve share of the market (iv) Meet or prevent competition (v) Maximize profits.

According to Stanton (1986), pricing is the key activity within the capitalistic system of free enterprise. The market price of a material or product influences wages, rent, interest and profits. That is, the price of product influences the price paid for the factors of production labour, land, capital and entrepreneurship. As a consequence, price is a regulator of the economic system because it influences the allocation of these factors of production. Also, pricing becomes very important during inflationary periods because the consumer confidence in the economy, buying psychology and buying behaviour are affected by price movements during inflation. Furthermore, in an economy, price is a major regulator because it influences the allocation of scarce resources. Market success in most industries or companies is determined by pricing strategies.

Price is also used as an indicator of quality for a consumer who lacks other information especially in the building materials market. However, with increase in prices of goods and services as a result of government policies, inflation, or other factors influencing price determination, there will be reduction in aggregate demand for goods and services which would reduce the aggregate products produced within the economy. This shows an interaction between total output and prices. Whether the interaction can produce any scientific base for the purpose of planning and forecasting or not is a question that needs to be answered. Therefore the objectives of the study are to: (a) Examine the statistical relationship existing between the rate of change of Building and construction GDP and rate of changes in prices of building material. (b) Examine a pattern of price development from GDP growth trend and to develop the statistical model.

METHODOLOGY

This research work has both synthetic and empirical aspect. The synthetic aspect involved review of relevant literature to provide a sound background to the study. This was achieved by abstraction from published statistics such as the annual abstract of statistics published by the Federal office of statistics and statistical bulletin published by Central Bank of Nigeria. The empirical work involved the assembly of published data of the building and construction components of the GDP from (1987-1996). Also, field tests were organised to obtain information on the price trends of building materials (cement, sand, iron bar, iron roofing sheets, hardwood and block). Field data on the selected materials were obtained from six different zones of the country through the use of questionnaire and the results were adequately weighted statistically.

The national mean values or prices for materials were computed by summing all the weighted data from twenty-five States of the Federation and the result divided by the number or sample size. The range of data, which is the distance from the lowest price to the highest price, was ignored. The national mean values for GDP and labour were further reduced to percentage change with 1987 as the base year. With the use of simple Regression Analysis as a statistical instrument, the studies were made of Percentage changes in the GDP (as contributed by Building and Construction Sector) versus percentage changes in weighted annual prices of material.

DATA ANALYSIS, RESULTS AND DISCUSSION.

Table 1. GDP (Building and construction) at constant factor cost. (Value in million naira).

Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
GDP B/const	1433	1579	1645	1727	1795	1866	1959	2018	2073	2093

Sources: Social Economic Profile 1998 by F.O.S. Lagos.

Table 2. NATIONAL MEAN VALUES OF PRICES OF MATERIALS (1987-1996)

Year	Cement / Bag	Sand/ Trip	Blocks / Unit	Bar12mm/ Ton	Ironsht / Bundle	Hardwood/ Length
1987	24.24	76.56	1.33	1562.19	392.11	19.04
1988	38.25	110.30	2.31	2621.71	468.41	24.06
1989	55.36	133.27	3.36	4341.44	634.45	28.84
1990	60.03	191.35	4.31	6054.48	779.67	38.66
1991	91.62	264.64	7.00	8258.67	984.03	56.04
1992	147.35	305.33	8.70	11790.21	1243.68	77.51
1993	218.92	519.01	13.28	16024.01	1630.88	109.55
1994	328.23	861.24	17.96	44651.07	2468.70	145.99
1995	424.17	1077.83	25.70	28817.85	3563.63	198.90
1996	459.67	1356.54	28.53	34833.56	4086.79	232.53

Sources: Author's Field Data

Table 3. Percentage increase of material prices and GDP with 1987 as base year

S/N	YEAR	CEMENT	SAND	BLOCK	BAR	IRONSHT	HARDWOOD	GDP
1	1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1988	57.8	44.07	73.68	67.82	19.46	26.37	10.19
3	1989	128.38	74.07	152.63	177.91	61.80	51.47	14.76
4	1990	147.65	149.93	224.06	287.56	98.84	103.05	20.51
5	1991	277.97	245.66	426.32	428.66	150.96	194.33	25.33
6	1992	507.88	298.81	554.14	654.72	217.18	307.09	30.22
7	1993	803.14	577.91	898.50	925.74	315.92	475.37	36.76
8	1994	1254.08	1024.92	1250.38	2758.24	529.59	666.75	40.83
9	1995	1649.88	1307.82	1832.33	1744.71	808.83	944.64	44.63
10	1996	1796.33	1671.87	2045.11	2129.79	942.26	1121.27	46.07

Source: Author's analysis of data

Regression analysis was performed using the data in Table 3 to achieve the 0bjectives of this research work. The six independent variables (materials) and the dependent variable (GDP) were regressed. The output is as follows.

1) Sand (2) Bar (3) Cement (4) Iron sheet (5) Hardwood (6) Block

R= 98.15%, R-square= 96.34%, R-square (adj)= 89.02%; F-test= 13.166; significant F= 0.0293; Standard Error= 5.153

Variable in the equation, Y= 6.178 + 0.017 Bar + 0.109 block –0.085 cement + 0.078 Hardwood – 0.026 ironsht – 0.078 sand.....(1)

From the statistical analysis, R-Sq which is the coefficient of determination was found to be 96.34%, which shows a high statistical significant relationship between percentage change in building and construction GDP, and percentage change in prices of building materials. This statistical relationship was significant at 2.93% or 0.0293 with standard error of 5.15; The experiment showed a strong relationship existing between change in the

Percentage of GDP (Building and construction) and changes in percentage materials with all the variables extended at once.

The interaction between GDP and prices of goods and services has confirmed that there is significant relationship existing between percentage change in building and construction contribution to the Gross Domestic product and prices of building material. A model of GDP = 6.178 + 0.171 bar +0.109 block – 0.085 cement + 0.0781 hardwood – 0.026 iron sheet – 0.078 sand was developed for material. (Equation 1)

CONCLUSION AND RECOMMENDATION

The interaction between GDP and prices of goods and services has statistically confirmed that there is significant relationship existing between percentage change in building and construction contribution to the Gross Domestic product and price of material. Therefore, it is recommended that economic planners and project managers should consider the use of percentage change in Building and Construction to the GDP before allocation of resources, and policy formulation.

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