Gross Domestic Product (GDP) and the Rising Cost of Some Selected Labour Inputs in Nigeria (1987- 1996)

By

J E Idiake

Department of Quantity Surveying, Federal University of Technology, Minna, Nigeria

The Building Construction in Nigeria is predominantly material and labour intensive. Faced with galloping inflationary tendency in the Nigerian economy, it becomes increasingly difficult to predict the cost of these two inputs particularly with the acute shortage of Construction data information. An attempt was made in this study to mount an empirical examination into the possibility of using GDP to predict the likely cost of labour input. Published statistical records of the Building Construction Components of the GDP were assembled for the period 1987 - 1996. Also, field tests were organised to obtain information on the price trends of skilled and unskilled labour. Using simple Regression Analysis as a statistical instrument, the relationship between percentage changes in the GDP (Building and Construction Section) versus percentage changes in weighted annual prices of Labour was tested. The study concluded that there is a strong statistical relationship between percentage changes in GDP (Building/Construction Sector) and the percentage change in the prices of some selected skilled and unskilled labour. It was therfore recommended that project managers; executing long term projects in the country should watch trends in percentage change in GDP in their planning strategies.

INTRODUCTION

Economic activity is generated by the wants of human beings, which seen to be insatiable in the aggregate. The means available in any economy for satisfying the wants of its population are scarce. They consist of the economy's resources; its labour and its capital; along with its available technology. The supplies of resources, together with the level of technology available, determine the maximum Gross Domestic Product or Gross National Product the country can turn out to satisfy wants. Dividing the country's GNP by its population yields its per capita GNP, which is a measure of its standard of living.

However, the production of buildings is one of the most important activities in any economy. A large of the national resources are usually used in the construction and maintenance of existing stock of buildings. This facts, 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, material, labour, plant and money.

A lot had been done in the field of management of site resources employing various techniques of management such as bar-chart, critical path analysis, S-graphs, cost ceiling systems, budgetary control techniques and the use of computer in resource management yet not much have been done in the field of cost data of site resources to provide some form of guidelines for cost planning, prediction and seasoned scientific advice to government officers.

There is a need to use the country's construction resources namely, material, labour capital and plant to best advantage. As building construction forms one of the key factors in any growing economy, increasing demand placed on building works definitely strains the available resources. Due to dwindling economic resources and limited access to available resources, it becomes imperative to continually predict demand and prices of labour rates with the aim of formulating such predictions into terms that allow resources to be assessed. This, coupled with the call by government for disciplined cost planning of public project forms the background of this research work. From the foregoing, it becomes clear that research word could be carried out on the basis of evaluating some macro-economic conditions and labour rates, taking cognisance of price distribution within the country Nigeria, to arrive at a cost information that will be of national significance, which will be relevant to planners, developers and investors nation wide.

This research work is one of such attempt at developing such cost information that will be of interest to the professionals in the building industry.

OBJECTIVES
The Objectives of the Study are to:

- Establish the rate of changes in prices of building construction Labour resource in Nigeria in relation to the contribution of the Building and Construction to the GDP.
- Establish a pattern of price examination from GDP growth trend using a statistical model which is to be developed.
- Examine the statistical relationship existing between the rate of change of Building and Construction GDP and rate of changes in prices of labour wages.

METHODOLOGY
Published statistical records of the Building and Construction Components of the GDP were assembled for the period (1987 - 1996) by abstraction from published statistics such as the annual abstract of statistics published by Federal office of Statistics and statistical bulletin published by Central Bank of Nigeria. Also, field tests were organised to obtain information on the price trends of skilled and unskilled labour (plumber, mason, electrician, painter, carpenter and casual labours). Field data on the selected materials were obtained from different six zones of the Country through the use of questionnaire and the results were adequately weighted statistically.

The National mean values or prices for labour were computed by summing all the weighted data from twenty-five States of the Federation and 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

141

further reduced to percentage change with 1987 as the base year. With the use of simple Regression Analysis as a statistical instrument, the following were studied: Percentage changes in the GDP (as contributed by Building and Construction Sector) on the Y-axis versus percentage changes in weighted annual prices of Labour.

A REVIEW OF THE RESEARCH COMPONENTS

Definition: 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, and by computing the expenditure needed to produce it. There are three approaches employed in measuring or calculating the gross domestic product of a nation. They are the income, output and expenditure approaches.

Ayeni (1997) defined as contractor's men comprising of all operative on the site executing the project. The include in the main, craftsmen, who are known to be qualified artisans, artisan (non-trade-tested) - these are artisan without certificates, apprentices of various cadres learning trades under qualified tradesmen, labourers performing all kinds of labour works on the site including foremen of trade groups and gangs of the labourers. Therefore labour is the effort, both physical and mental, made by human beings in production.

Literature Review
The Gross Domestic Product (GDP) is one of the most frequently used measures of economic performance or development. And major changes in the GDP of the nation may in fact reflect severe problems or impressive gains. Dominick and Edward (1977) defined economic development as the process whereby a country's real per capita gross national product (GNP) or income increases over a sustained period of time through continuing increases in per capita productivity.

In his contribution Lewis (1976) said that human resources determine the size and quantity of the labour force and that a larger population will result in a larger work force and greater production and therefore an increase in GDP. He added that a larger population also means additional consumers of total output and GDP or GNP per capita may therefore decline. He also noted that, in the short run, a population increase is usually disadvantageous because it immediately raises the number of consumer but does not necessarily increase the workforce that in terms of growth the most significant element within the population is the labour force.

Berkeley (1980) explained that growth or development occurs when the amount, which can be produced and consumed per head of the population, increases. Productive capacity is the output, measured by the GDP of a nation, as achieved when all of its productive resources, for instance labour, are fully employed. Although he added that the full employment qualification is often dropped and growth is taken as the change in GDP per head, after allowing for changes in the value of money. He further noted that one important factor or determinant of the rate of economic growth is the rate of the invention and innovation. These as he further noted, will provide new investment opportunities and

permit greater production, which in turn affect total output. From the foregoing, it then follows that increase in the GDP figures means progress for the nation and the populace.

According to Wonnacott and Wonnacott (1982), the more the growth, the bigger the incomes of workers and higher standard of living. In comparing the standard of living of different nations, the gross domestic product figures have its usefulness. Although the yardstick for measuring or comparing the standard of living of countries and people within a country is different. Growth is measured in different ways. Firstly, it is an increase in real gross domestic or national product, and secondly it is the increase in gross national product per capita. Both scales have their usefulness in an economic planning depending on the comparison one is interested in. Economic planners make reference to GDP when assessing the economic productivity of a nation and the rate of growth of total output. Alternatively, if one wants to determine the living standard of nations, GDP per capita becomes the basis for comparison and not necessarily the GDP figures. Thus one can say that a country is economically much more powerful than the other but the other has a higher standard of living.

Harvey (1986) continued that when GDP is used to compare the standard of living of different countries, GDP figures must be subjected to qualifications additional to those of price changes, population increase etc. The combined increase in the quantity and quality of labour and in capital stock does not necessarily account for all of the increase in total output. The GDP of most advanced countries have risen in recent times faster than their combine capital and labour output.

Lewis further observed that the secret behind the increase has been due to scientific and technological acknowledgement in terms of capital equipment alone, and that it includes management of human resources, division of labour, utilisation of time and energies available.

Lipsey (1989) sees human resources as an important factor in the growth rate of gross domestic product He submitted that a country's growth rate would be higher, if the working population is growing rapidly relative to the non-working population. He added that, economic growth however, can go on raising national income for centuries on end, provided the population is constant, even with a modest population growth rate of 2 percent per year.

Asiegbu (1991) in his view stated that total output is a function of total resource inputs. As a consequence, a more efficient and effective labour input contribute to production process, hence labour productivity is considered a critical factor for the enhancement of both the level and rate of socio-economic development. Following the surplus output of goods and services made possible by his level of labour productivity in the production process savings, autonomous capital formation or investment which are 'sine qua non' for economic growth and development are easily made available. These, in turn, give rise to increases in output and standard of living of the people. He however, lamented that these facts are not given sufficient recognition in policy and programme formulation in Nigeria.

143

Ogirri (1996), stated that, consideration for technology is important, perhaps in the assessment of total output. Technology, according to Ogiri (1996), has transformed markets around the world and these markets now compete on the basis of efficiency, and speed of execution. He further noted that should a market not met the speed and efficiency standard, the capital meant for it will invariably be invested elsewhere, possibly resulting in net capital outflow.

In summary, from the foregoing, supply factors by way of human capital formation, natural resources, capital formation and level of scientific and technological advancement contribute to total output. The measure of economic development of a nation lies on these factors. A well trained army of human resources will increase productivity within the economy. Scale of economics production is raised with technological changes leading to the building of more production sales outlets or accommodation. Such economic activity leads to increase in building or construction activities with full employment of construction resources.

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 thereby the aggregate

products produced within the economy. This shows an interaction between total output and prices. Will the interaction produce any scientific analysis for the purpose of planning and forecasting? This is the theme of the next subheading.

Table 1 shows the Building and Construction contribution to the Gross Domestic Product from 1987 to 1996. The GDP figures are valued at constant factor cost. A gradual increase is noticed in the Building and Construction GDP values over the period under review. This is an indication that the contribution of building and construction to the total GDP is on the increase.

Table 2 presents the national values of wages of tradesmen and casual workers per day from 1987 to 1996. The national mean values or prices for labour were computed by finding the mean of all the weighted data from twenty-five States of the Federation, which is about 75% geographical spread. The means for each tradesmen over the period of ten years that is from 1987 to 1996 showed a steady increase in the wages of tradesmen in Nigeria (See Fig 1).

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

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

permit greater production, which in turn affect total output. From the foregoing, it then follows that increase in the GDP figures means progress for the nation and the populace.

According to Wonnacott and Wonnacott (1982), the more the growth, the bigger the incomes of workers and higher standard of living. In comparing the standard of living of different nations, the gross domestic product figures have its usefulness. Although the yardstick for measuring or comparing the standard of living of countries and people within a country is different. Growth is measured in different ways. Firstly, it is an increase in real gross domestic or national product, and secondly it is the increase in gross national product per capita. Both scales have their usefulness in an economic planning depending on the comparison one is interested in. Economic planners make reference to GDP when assessing the economic productivity of a nation and the rate of growth of total output. Alternatively, if one wants to determine the living standard of nations, GDP per capita becomes the basis for comparison and not necessarily the GDP figures. Thus one can say that a country is economically much more powerful than the other but the other has a higher standard of living.

Harvey (1986) continued that when GDP is used to compare the standard of living of different countries, GDP figures must be subjected to qualifications additional to those of price changes, population increase etc. The combined increase in the quantity and quality of labour and in capital stock does not necessarily account for all of the increase in total output. The GDP of most advanced countries have risen in recent times faster than their combine capital and labour output.

Lewis further observed that the secret behind the increase has been due to scientific and technological acknowledgement in terms of capital equipment alone, and that it includes management of human resources, division of labour, utilisation of time and energies available.

Lipsey (1989) sees human resources as an important factor in the growth rate of gross domestic product He submitted that a country's growth rate would be higher, if the working population is growing rapidly relative to the non-working population. He added that, economic growth however, can go on raising national income for centuries on end, provided the population is constant, even with a modest population growth rate of 2 percent per year.

Asiegbu (1991) in his view stated that total output is a function of total resource inputs. As a consequence, a more efficient and effective labour input contribute to production process, hence labour productivity is considered a critical factor for the enhancement of both the level and rate of socio-economic development. Following the surplus output of goods and services made possible by his level of labour productivity in the production process savings, autonomous capital formation or investment which are 'sine qua non' for economic growth and development are easily made available. These, in turn, give rise to increases in output and standard of living of the people. He however, lamented that these facts are not given sufficient recognition in policy and programme formulation in Nigeria.

Ogirri (1996), stated that, consideration for technology is important, perhaps in the assessment of total output. Technology, according to Ogiri (1996), has transformed markets around the world and these markets now compete on the basis of efficiency, and speed of execution. He further noted that should a market not met the speed and efficiency standard, the capital meant for it will invariably be invested elsewhere, possibly resulting in net capital outflow.

In summary, from the foregoing, supply factors by way of human capital formation, natural resources, capital formation and level of scientific and technological advancement contribute to total output. The measure of economic development of a nation lies on these factors. A well trained army of human resources will increase productivity within the economy. Scale of economics production is raised with technological changes leading to the building of more production sales outlets or accommodation. Such economic activity leads to increase in building or construction activities with full employment of construction resources.

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 thereby the aggregate products produced within the economy. This shows an interaction between total output and prices. Will the interaction produce any scientific analysis for the purpose of planning and forecasting? This is the theme of the next subheading.

Table 1 shows the Building and Construction contribution to the Gross Domestic Product from 1987 to 1996. The GDP figures are valued at constant factor cost. A gradual increase is noticed in the Building and Construction GDP values over the period under review. This is an indication that the contribution of building and construction to the total GDP is on the increase.

Table 2 presents the national values of wages of tradesmen and casual workers per day from 1987 to 1996. The national mean values or prices for labour were computed by finding the mean of all the weighted data from twenty-five States of the Federation, which is about 75% geographical spread. The means for each tradesmen over the period of ten years that is from 1987 to 1996 showed a steady increase in the wages of tradesmen in Nigeria (See Fig 1).

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

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

Table 2: National Mean Values of Wage of Tradesmen and Casual Workers per day (1987-1996)

S/NO	YEAR	CARPENTER	CASUAL LABOUR	ELECTRICIAN	MASON	PAINTERS	PLUMBER
1	1987	16.79	12.31	16.46	25.08	16.08	16.52
2	1988	21.76	11.42	21.48	20.48	21.55	22.56
3	1989	33.66	24.66	34.83	32.10	34.10	34.32
4	1990	57.556	28.61	54.84	55.91	55.91	53.74
5	1991	89.69	52.29	89.95	88.93	91.32	98.57
6	1992	123.64	74.86	124.35	127.31	124.07	127.50
7	1993	172.83	103.59	172.12	175.13	172.71	171.07
8	1994	200.83	126.45	201.84	205.97	206.36	220.88
9	1995	275.21	159.74	279.07	286.27	275.92	271.07
10	1996	345.68	202.31	384.10	257.10	343.85	344.85

Source: Author's Analysis of Data.

In this experiment, regression analysis was performed for both the independent variables and dependent variable using the data in Table 3. All the six variables were entered into the equation giving the following output.

Variables entered on step number

(i) Carpenter (ii) Casual Labour (iii) Electrician (iv) Mason (v) Painter (vi) Plumber

R=97.28%, R-square=94.65%, R0sq. (adj.) = 90.35%

Standard error =4.83, F=22.074, Significant F=0.0023
Variables in the Equation

$$Y=1.485 + 0.190 \text{ Carpenter} + 0.016 \text{ Caslab} - 0.317 \text{ Mason} + 0.037 \text{ Plumber}$$

..(1)

.The coefficient of determination from the above analysis was very high with a significance level of 0.0022 and appreciable standard error value of 4.830.

All the above results showed a strong relationship existing between the change in percentage of the Building and Construction contribution to GDP and change in percentage of prices of Labour.

RATE OF CHANGE OF GDP (BUILDING AND CONSTRUCTION) AND PRICES OF CONSTRUCTION LABOUR RESOURCE

The result of the experiment conducted gave the confidence to proceed with further comparative analysis of the percentage rate of change of Building and Construction contribution to the Gross Domestic Product and the percentage rate of change of prices of construction Labour resources. Table 5 shows the average rate of change of Building and construction contribution to Gross Domestic Product. While Table 8 shows the average percentage rate of change of prices of labour wages.

145

Fig1. Trends of National Mean Labour Wages
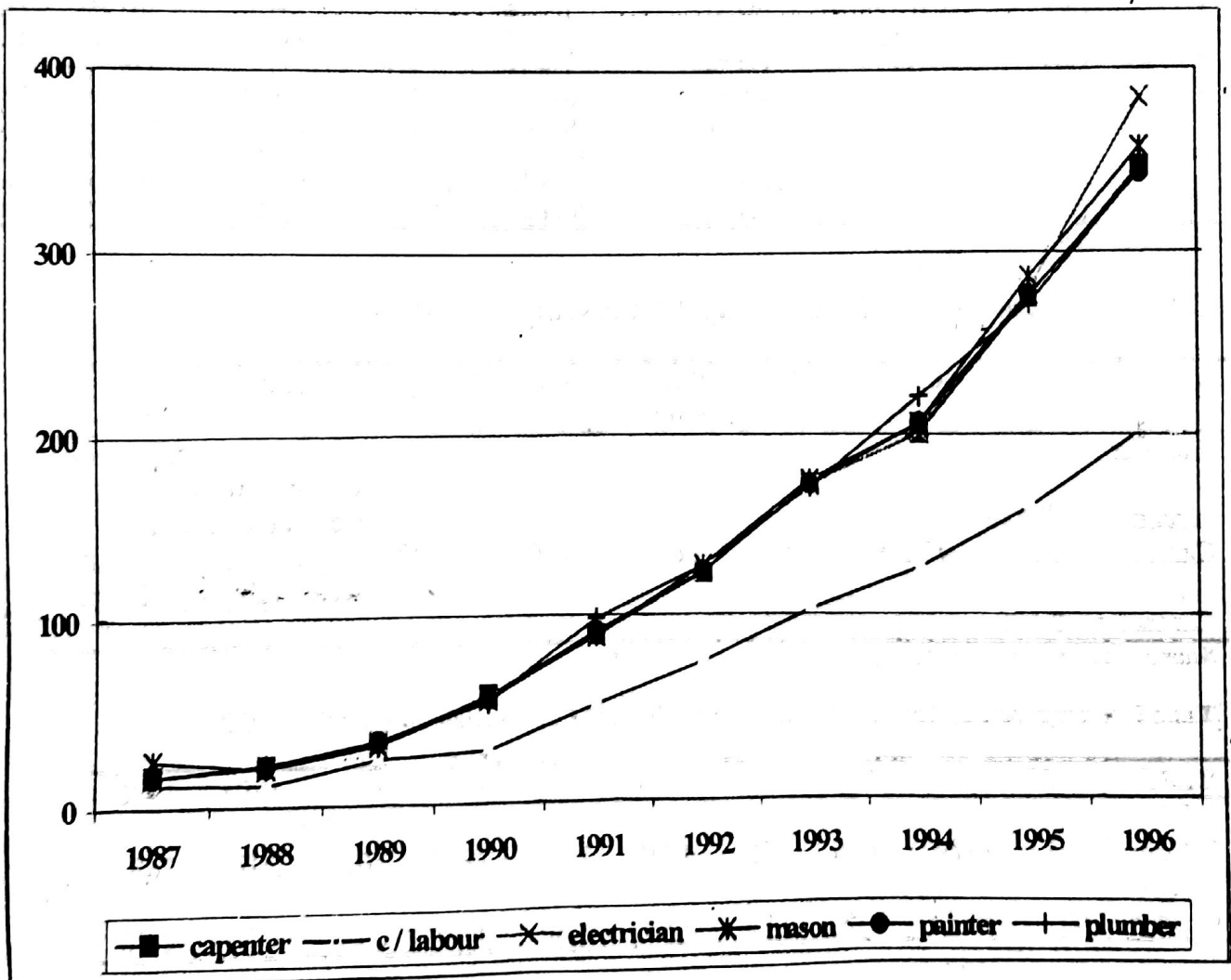
GRP values in Table 1 and national mean prices of labour wages shown in Table 2 were further reduced to percentage change with 1987 as the base year, the corresponding results are shown in Table 3.

Table 3: Percentage Increase of Labour Wages and G.D.P. with 1987 as base Year

S/NO	YEAR	CARPENTER	C/LABOUR	ELECTRICIAN	MASON	PAINTER	PLUMBER	GDP
1	1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1988	29.60	-7.23	30.50	-18.34	29.98	36.56	10.19
3	1989	100.48	100.32	106.74	30.62	105.67	107.75	14.76
4	1990	242.82	132.41	233.17	123.84	237.21	225.30	20.51
5	1991	434.19	324.78	446.48	254.59	450.78	448.24	25.33
6	1992	636.39	508.37	655.47	407.62	648.31	671.79	30.22
7	1993	929.36	741.51	945.69	598.29	941.68	935.53	36.76
8	1994	1091.36	927.21	1126.25	721.25	1144.63	1237.05	40.83
9	1995	1539.13	1197.64	1595.44	1041.43	1564.17	1540.86	44.63
10	1996	1964.32	1543.46	2014.82	1323.84	1973.88	1987.47	46.07

Source: Author's Analysis of Data

Table 4: Summary of Results for Group Relationship with GDP

Variables	B0	R	R-Sq.	Std error	F-test	F	Remarks
Plumber	0.037						Four out of six variables were
Mason	-0.318						Considered in the
Caslab	0.016	97.28%	94.64%	4.83	22.09	0.0022	Regression line. And were highly significant
Carpenter	0.190						

Source: Author's Analysis of Data.

Table 5: Average Annual Incremental Rate of Building and Construction Contribution to GDP

YEAR	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
GDP B/Con	1433	1579	1645	1727	1795	1866	1959	2018	2073	2093
% age Change	00	10.18	4.18	4.98	3.94	3.80	4.70	3.00	2.73	0.96

Source: Author's Analysis of Data.

Table 6: Computation of Average Rate of Change of GDP

Variable	Mean (Avg.)	Std Dev.	Minimum	Max	N
Percentage change	4.27	2.52	0.96	10.18	9

Table 7: Modification of Computation of Average Rate of Change of GDP in Table 4.12.

Variable	Mean (Avg.)	Std Dev.	Minimum	Max	N
Percentage change	3.9	0.82	2.73	4.98	7

The computation of the average rate of change of GDP gave a value of 4.27 with a standard deviation of 2.52. This deviation from mean could be traced to the presence of some extreme values noticeable in the percentage rate of change, 10.18 and 0.96 for 1988 and 1996 respectively (Table 5). From the above, it becomes necessary to modify or improve the computation by throwing out the extreme values. The modified or improved version is seen in table 7 with average rate value of 3.9 and standard deviation of 0.82 which may be considered reasonable.

The percentage rate of change for the above research component was computed using the annual incremental rate formula. The average annual incremental rate for Building and Construction contribution to the Gross Domestic Product is 3.9% while that for Labour wages is 40.543%. The percentage figure for labour is greater than the percentage figure for GDP (Building and Construction). This confirms the rising cost in construction. As a result of this large percentage increase in price of labour, the demand for building and construction output is kept at an average annual rate of 3.9%. This could be improved upon if prices of labour are kept at a minimal percentage increase.

FINDINGS

The interaction between GDP and prices of goods and services was statistically conformed that there is significant

relationship existing between percentage change in building and construction contribution to the Gross Domestic Product and prices of Labour. The annual rate of change of Gross Domestic Product (Building and Construction) is much lower than the rate of change of prices of labour, which is an indication of rising cost in construction. A model formula of $Y = 1.484 + 0.190$ carpenter $+ 0.016$ labour $- 0.318$ mason $+ 0.0367$ plumber was developed for planning purpose.

CONCLUSION

It has been highlighted that GDP is an important macro variable in any economic set up. Growth occurs when the aggregate production and consumption increases. Therefore, for growth to be steady there must be continuous demand and production of goods and services. As a consequence, the demand and supply factors must be enhanced to achieve the expected steady growth. For instance, a well-trained army of human resources will increase productivity within the economy. Scale of economic production is raised with technological changes leading to the building of more production sales outlet or accommodation. Such economic activity leads to increase in building or construction activities with full employment of construction resources and consequently an increase in total output.

In this study, the interaction between GDP and prices of goods and services was statistically confirmed that there is

significant relationship existing between percentage change in building and construction contribution to the Gross Domestic Product and prices of Labour.

RECOMMENDATION

i. Economic planners should examine the use of percentage change in the Building and Construction to the GDP before the allocation of resources especially during budgetary preparation and formulation.

ii. Managers wishing to manage long term projects in Nigeria should watch the trends of percentage change in the building and construction contribution to GDP and prices of labour and also, using model developed to make projections.

iii. Trends in the percentage change of prices of labour in relation to the Building and Construction Contribution to the GDP should be one of the barometers for measuring rising cost in construction by construction manager.

REFERENCES

Ayeni J. O. (1997): Principle of Tendering and Estimating, Second Edition, Builder's Magazine Ltd, Lagos.

Asiegbu O. (1991): Increasing Productivity in Nigeria: Productivity Measurement and Improvement. A Publication of National Productivity Centre Lagos.

Berkeley H. (1980a): An Introduction to Economics for Students of Agriculture, Pergman Press. Pp 253, 254, 256

Dominick and Edward D. (1977): Development Economic, Schaum's outline series. Theory and problems. McGraw-Hill, New York.

Harvey J. (1986): Intermediate Economics, Fourth Edition, Macmillan Education Limited London Pp. 240, 247, 248.

Lewis C. S (1976): Economics (Second Edition) Addision - Wesley Company, Incorporated USA.

Lipsey R. G. (1989): An Introduction to positive Economic. Seventh Edition, Weidenfeid and Nicolson.

Ogiri H (1996): The Challenges of Capital Market reform in Nigeria. A Journal of Chartered Institute of Bankers of Nigeria, June Edition.

Wonnacott and Wonnacott (182): Economics' Second Edition McGraw-Hill Publisher London Pp. 117.