HUMAN CAPITAL DEVELOPMENT AND ECONOMIC GROWTH IN NIGERIA

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Abstract

The study examined the impact of human capital development on economic growth in Nigeria covering the period of 1981 to 2015. The study used Augmented Dickey Fuller test, Johansen co-integration test, error correction test and impulse response/variance decomposition for the analysis. The study found that data for the variables were not stationary but became stationary after the first difference. There was a bidirectional relationship between economic growth and government expenditure on health and between economic growth and government expenditure on education at 5% level of significance. The study also found that there is long-run positive relationship between human capital development and economic growth in Nigeria. The study recommends that the Nigerian government should sustain increased investment in education and health and encourage private investment in the sectors too.

Key Words: Economic Growth, Government Expenditure on Education, Government Expenditure on Health and Human Capital.

1.0 Introduction

Human capital refers to the abilities and skills of human resources while human capital development refers to the process of acquiring and increasing the number of persons who have the skills, education and experience which are crucial for economic growth of a country (Harbison, 1962). It is a theoretical fact that the impact of this Human Capital Development (HCD) on economic growth is positive.However, it may not apply or equally be true in all empirical situations as this depends on a lot of factors such as; the quality and quantity of education, government policy on education, structure of the economy, among others. Hence, the examination of the relationship between human capital development and economic growth in Nigeria is an outstanding empirical verification exercise whose need cannot be disputed.

Nigeria as a country is immensely endowed both in natural and human resources. Nigeria used to depend on physical capital for her growth and development without putting in to consideration the role played by human capital in the development process. In recent years, human capital has been recognized as an agent of national development in all countries of the world (Isola & Alani, 2012). As the global economy shift towards more knowledge-based sectors (such as the manufacturing sector like the manufacturing of ICT devices, pharmaceuticals, and telecommunication) and skills, human capital development becomes a central issue for policy makers and practitioners engaged in economic development both at the national and regional level (Adelakun, 2011). This has the tendencies of revamping the Nigerian economy.

Studies by Schultz (1961), Denison (1962) and a host of others confirmed that, an economy depends on education to foster growth. Burnet, Marble and Patrinos (1995) said investment on education raises per capital Gross National Product (GNP) reduces poverty and supports the expansion of knowledge thereby reducing inequality. According to them, investment on education and training influences man's productivity. Thus, education is a crucial component of human capital development such that, a country cannot afford to leave it to the whims and caprices of individual choice. Similarly, health is fundamental to economic growth and development and is one of the key determinants of economic performance both at the micro and macro levels. This is derived from the fact that, health is both a direct component of human wellbeing and is a form of human capital that increases an individual's capabilities (Bloom & Canning, 2003). Grossman and Eihanah (1989) have equally demonstrated that, health is a form of human capital. Schultz (1959) also argued that, population quality (that is, a healthy population) is the decisive factor of production and emphasized the merits of investing in education and health. Barro (1991) and Grossman and Eihanah (1989) also commented on health as a capital productive asset and an engine of economic growth and that healthy individual is more efficient at assimilating knowledge leading to higher productivity levels.In the similar vein, Ogujiuba (2013) argued that, there can be no significant economic growth in any country without adequate human capital development.

Human capital development has therefore become very imperative in the determination of the level of economic growth of an economy. Despite the importance of educational institutions and the relevance of human capital development generally, Nigeria spends insignificant proportion of her financial resources on education and health which is often below the recommendations by the United Nations and World Health Organisation (WHO) respectively. In Nigeria, education expenditure as a proportion of Gross Domestic Product (GDP) averaged 5.64 percent between 1986 and 1990 compared to 5.84 percent between 2005 and 2008. Records have also shown that the federal government recurrent expenditure in education and health average ? 85.92 billion and ? 49.69 billion in 1981 and 2015 respectively (CBN, 2015). The education expenditure performance generally is much lower than the 26 percent of national budget, as recommended by the United Nations (CBN, 2009). More so, it is also apparent from frequent references to the WHO recommendation that countries should spend 5 percent of GDP on health, a recommendation which was never formally approved and which has little basis in fact (Savedoff, 2003).

On the other hand, human capital development in Nigeria has been an intractable problem because of the uncontrolled increase in population (Allege & Ogujiuba, 2005). This has led to the push in the cost of human resource development constantly upward thereby creating a wide gap in terms of cost of training which the government needs to fill. In spite of the resources that have been devoid to enhance economic growth by successive governments; no noticeable success has been achieved since economic growth situation in Nigeria still remain very low.

The paradox accompanying this belief is that, despite the huge investment in education, there exists no strong evidence of growth-promoting externalities of education in Nigeria, but rather, education expansion has further deepened social inequality and inculcated negative social changes such as cultism, rent seeking, sexual harassment, sorting, result racketeering, industrial disputes, brain drain among other social vices in the Nigerian school system and the society at large. Many of the studies are of the opinion that human capital development has impacted positively on economic growth in Nigeria (Adeyemi & Ogunsola 2016; Eigbiremolen & Anaduaka, 2014; Cheren, 2013;

Mba, Mba, Ogbuabor & Ikpegbu, 2013; Isola & Alani, 2012; Johnson, 2011; Adawo, 2011; Oluwatobi & Ogunrinola, 2011; Sankay, Ismail & Shaari, 2010; Owoeye & Adenuga, 2007). Another strand of the empirical literature has ascertained negative impact of human capital development on economic growth in the country (Ndiyo, 2002; Adebiyi, 2005).

But, some of the methodological approaches employed in the works reviewed were inadequate in addressing the issues related to the relationship between human capital development and economic growth in Nigeria. For instance, the use of ordinary least square technique or Auto-Regressive Distributed Lag (ARDL) approach where public expenditure on education and health is not truly exogenous in economic growth model and/or the use of Johansen cointegration and ordinary least square technique were gross misapplication of the appropriate technique(s). Hence, the need to provide a framework that will fill the existing empirical gap on the relationship between human capital development and economic growth in Nigeria is imperative. This is the motivation behind this study.

2.0 Literature Review

2.1 Human Capital Development

Human capital development refers to the process of acquiring and increasing the number of skilled persons who have the education and experience which are critical for the economic growth of the country (Harbison, 1973). Human capital in Nigeria is produced mainly in the schooling sector and health service sector. The government uses public resources for education in the schooling sector such as expenditures for books, teaching material and other inputs in the process of human capital formation. Thus, the input in the schooling sector is composed of time spent for education by the individual and of schooling expenditures by the government. The economy is populated by an innate sequence of non-overlapping generations of individuals. Thus, the types of human capital at disposal differ in the manner in which they are built up, and in the returns received from them by individuals. The main inputs in building up human capital are individual ability and time spent for education. From the individual point of view, the time available is limited by the expected lifetime duration, which is therefore considered as given by the individual. Also, greater provision of schooling

society increases national productivity and economic growth. Human capital is a term economists often use for education, health and other human capabilities that can raise productivity when increased (Todaro & Smith, 2003). The concept of human capital refers to the abilities and skills of human resources of a country, while human capital formation (development) refers to the process of acquiring and increasing the number of persons who have the skills, education and experience that are critical for economic for economic growth and development of a country (Okojie, 1995).

According to Becker (1964), human capital is directly useful in the production process. It increases a worker's productivity in all tasks, though possibly differentially in different tasks, organizations, and situations. According to Acemoglu (2013), Gardener viewed human capital as seen as a unidimensional, since there are many dimensions or types of skills. A simple version of this approach would emphasize mental and physical abilities as different skills while Schultz (1959) and Nelson and Phelps (1966) assumes that human capital stock determines the ability to assimilate the technologies and that human capital affects the speed of technological catch-up and diffusion of knowledge. Bowles and Gintis (1993) sees human capital as the capacity to work in organizations, obey orders, and generally adapt to life in a hierarchical/capitalist society. According to him, the main role of schools is to instill in individuals, the correct ideology and approach towards life. This explains the relevance of investing in education for human capital development. More so, Spence argued that observable measures of human capital are more a signal of ability than characteristics independently useful in the production process. It can be deduced from above that human capital will be valued in the market because it increases firms' profits.

The sources of human capital differentials are; innate ability, schooling, school quality and non-schooling investments, training and pre-labor market influences. This study is focused on the investment in human capital through training and non-school investment such as health expenditure by the government. The emergence of human capital development started during the Eric Ashby commission (1959) in Nigeria. Itlargely formed the bedrock of higher education development in Nigeria. The commission was set up in April 1959, with the mandate to conduct an investigation into Nigeria's needs in the field of higher education or post school certificate and higher education over the next twenty years. This was largely informed by the manpower needed at

independence to replace expatriate officials and the report was submitted in September 1960, a month before independence.

2.2 Economic growth

According to Guru (2016), economic growth can be defined in two ways. In one way, economic growth is defined as sustained annual increases in an economy's real national income over a long period of time. In other words, economic growth means rising trend of net national product at constant prices. This definition has been criticized by some economists as inadequate and unsatisfactory. They argue that total national income may be increasing and yet the standard of living of the people may be falling. This can happen when the population is increasing at a faster rate than total national income. Hence, the second and better way of defining economic growth is to do so in terms of per capita income. According to the second view of Guru (2016) economic growth means the annual increase in real per capita income of a country over the long period. To Amadeo (2016), economic growth is how much more the economy produces than it did before and that if the economy is producing more, it makes businesses to strive better. That give companies capital to invest and hire more employees. According to Daly, Czech, Blackwelder, Magnus-Johnston, and Zencey (2010), the term economic growth has two distinct meanings. Sometimes it refers to the growth of that thing we call the economy (the physical subsystem of our world made up of the stocks of population and wealth; and the flows of production and consumption). But the term has a second very different meaning-if the growth of some thing or some activity causes benefits to increase faster than costs– that is to say, growth that is economic in the sense that it yields a net benefit or a profit. To Kessier (2012), economic growth occurs when a society becomes more productive and is able to produce more goods and services.

Economic growth can therefore be seen as the annual increase or improvement in the real per capita income (real GDP per capita or output per person) of a country over a long period of time. This is measured using annual real GDP which is the monetary value of all final goods and services at market prices with year 2010 as the base year. Some of the determinants of economic growth are:investment, human capital, innovation and R&D activities, trade openness, Foreign Direct Investment (FDI), institutional framework, political factors and social-cultural factors.

23 Empirical Review

Adeyemi and Ogunsola (2016) examined the impact of human capital development on economic growth in Nigeria using time series data spanning from 1980 to 2013. The study employed ARDL Co-integration analysis to estimate the relationship among the variables used in the study. The study found a long-run co-integration among the variables. The findings from the study also revealed that there is positive long-run relationship among secondary school enrolment, public expenditure on education, life expectancy rate, gross capital formation and economic growth but it was statistically insignificant. The results also showed negative long-run relationship among primary, tertiary school enrolment, public expenditure on health and economic growth. The study therefore recommended that government should put in place the required education and training policy that would guarantee quality schooling for primary and tertiary education and should also commit more funds to health sector to enhance human capital development.

Jaiyeoba (2015) examined the relationship between human capital investment and economic growth in Nigeria using time series data from 1982 to 2011. The study used trend analysis, Johansen cointegration and ordinary least square technique. Empirical findings however indicate that there is a long-run relationship between government expenditure on education, health and economic growth. The variables: health and education expenditure, secondary and tertiary enrolment rate and gross fixed capital formation appear with the expected positive signs and are statistically significant (except government expenditure on education and primary enrolment rate). The findings of this work have strong implications on education and health policies and considering that they are of great debate in the country. Therefore, this study recommends that in order to accelerate growth and liberate Nigerians from the vicious cycle of poverty, the government should put in place policies geared towards massive investment in the education and health.

Eigbiremolen and Anaduaka (2014) employed the augmented Solow human-capital-growth model to investigate the impact of human capital development on national output in Nigeria using quarterly time series data from 1999 to 2012. The study used Johansen cointegration test. The results showed that human capital development, in line with theory, exhibits significant positive impact on output level. The study further revealed a relatively inelastic

relationship between human capital development and output level. The study recommended that government and policy makers should make concerted and sincere efforts in building and developing human capacity through adequate educational funding across all levels.

Oluwatoyin (2013) examined human capital investment and economic growth in Nigeria. The study used Augmented Dickey Fuller (ADF) tests and found out that a positive relationship exists between government expenditure on education and economic growth while a negative relationship exists between government expenditure on health and economic growth. The study therefore recommended that the government should increase not just the amount of expenditure made on the education and health sectors, but also the percentage of its total expenditure accorded to these sectors should be adopted.

Mba, Mba, Ogbuabor and Ikpegbu (2013) evaluated the relevance of human capital development on the growth of Nigerian economy. The study used Ordinary Least Square (OLS) technique. The study also used GDP as a proxy for economic growth; Per Capital Real Gross Domestic Product, primary school enrolment, public expenditure on education and health, life expectancy, stock of physical capital as proxy for human capital. It was found from study that there is a strong positive relationship between human capital development and economic growth. The study therefore recommended revisiting the man-power needs of the various sectors of the economy while workable policies should be put in place to bring about an overall economic growth, expenditures on health and public education should be utilized effectively and efficiently so that the country would experience quality health care services and quality educational system.

Isola and Alani (2012) evaluated the contribution of different measures of human capital development to economic growth in Nigeria. It used data from Nigeria and adopted the growth account model which specifies the growth of GDP as a function of labour and capital. The model also included a measure of policy reforms. Based on the estimated regression and a descriptive statistical analysis of trends of government commitment to human capital development, it was found that though little commitment had been accorded health compare to education, empirical analysis showed that both education and health components of human capital development are crucial to economic growth in Nigeria.

Amassoma and Nwosa (2011) studies the causal nexus between human capital Investment and economic growth in Nigeria for sustainable development in Africa at large between 1970 and 2009 using a Vector Error Correction (VEC) and Pairwise granger causality methodologies. The result from the study shows no causality between human capital development and economic growth. The study recommended the need to increase budgetary allocation to the education and health sector and the establishment of sound and well-functioning vocational institute needed to bring about the needed growth in human capital that can stimulate economic growth. Also, the study identified that labour mismatch is an issue that government needs to reckon with in order to accelerate and sustain economic growth.

Johnson (2011) examined human capital development and economic growth in Nigeria and asserted that human capital is an important factor used in converting all resources to mankind's use and benefit. The study used conceptual analytical framework that employs the theoretical and ordinary least square (OLS) to analyze the relationship using the GDP as proxy for economic growth; total government expenditure on education and health, and the enrolment pattern of tertiary, secondary and primary schools as proxy for human capital. The found that there is strong positive relationship between human capital development and economic growth and therefore recommended that stakeholders need to evolve a more pragmatic means of developing the human capabilities, since it is seen as an important tool for economic growth in Nigeria and proper institutional framework should be put in place to look into the manpower needs of the various sectors and implement policies that will lead to the overall growth of the economy.

Following from the above empirical works reviewed, it can be deduced that some of the methodological approaches employed in the works were grossly inadequate in addressing the issues relating to the relationship between human capital development and economic growth in Nigeria. That is, the use of ordinary least square technique or Auto-Regressive Distributed Lag (ARDL) approach where public expenditure on education and health is not truly exogenous in economic growth model and/or the use of Johansen cointegration test jointly ordinary least square technique were gross misapplication of the appropriate technique(s). This is because, estimating the system of equation by applying ordinary least squares often leads to

simultaneous equation bias. Hence, the need to provide an appropriate technique to examine the relationship between human capital development and economic growth in Nigeria is an empirical verification exercise whose need cannot be disputed.

3.0 Methodology

This research work embraces econometrical techniques in examining the impact of human capital development and economic development in Nigeria. The econometrical techniques consist of: unit root test, causality test, Johansen co-integration test and error correction test. Secondary data were used in the study. Data on GDP per capita and labour force were source from World Bank Statistics while data on government expenditure on education and health and gross fixed capital formation were sourced from Central Bank of Nigeria Bulletin.

3.1 Theoretical Model and Model Specification

Following the Solow-Swan Model also known as exogenous growth model which was developed independently by Solow (1956) and Swan (1956) using the idea of Cobb-Douglas production function (a model of long-run economic growth set within the framework of neoclassical economics), an economic growth model can be expressed as:

$$Y = f(K^{\propto} AL^{1-\propto}) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (1)$$

Where

Y = Real Output

K = Capital Accumulation or composition

L = Labour or Population Growth

Thus,

$$Y = f(K^{\propto} AL^{1-\propto}) \quad - \quad - \quad - \quad - \quad - \quad (2)$$

Where

$0 < \propto > 1$ is the elasticity of output with respect capital, *Y* represents total output and *A* refers to labour augmenting technology or knowledge. Hence, AL represents effective labour. However, Mankiw, Romer and Weil (1992) created a human capital augmented version of the Solow-Swan model which can be stated as: $Y = f(K^{\propto} H^{\beta} AL^{1-\propto-\beta}) \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (3)$

Where H is the stock of human capital.
Transforming the model and the taking natural logarithm:

$$lnY = f(\alpha lnK \beta lnH\ A(1-\alpha-\beta)lnL) \quad - \quad - \quad - \quad - \quad - \quad - \quad (4)$$

Thus, following the Mankiw, Romer and Weil (1992) augmented version of the Solow-Swan model, taking labour force to represent effective labour, GDP per capital *(GDPP)* for Output (Y), and Gross Fixed Capital Formation *(GFCF)* for capital accumulation or composition, the new model becomes:

$$lnGDPP_t = f(lnGEXPE_t, lnGEXPH_t, lnGFCF_t, lnLABF_t) \quad - \quad - \quad - \quad - \quad (5)$$

Where

$GDPP_t$	=	GDP per capita
$GEXPE_t$	=	Government Expenditure on Education
$GEXPH_t$	=	Government Expenditure on Health
$GFCF_t$	=	Gross Fixed Capital Formation
$LABF_t$	=	Labour Force
ln	=	Natural Logarithm

This is aimed at examining the role of public expenditure on education and health to economic growth within a VAR framework. Therefore, converting equation (5) to a probabilistic mathematical form as follows:

$$lnGDPP_t = \beta_0 + \beta_1 lnGEXPE_t + \beta_2 lnGEXPH_t + \beta_3 lnGFCF_t + \beta_4 lnLABF_t + \mu \quad - \quad - \quad (6)$$

The Vector Autoregressive (VAR) structure of the model is stated below:

$$lnGDPP_t = \beta_0 + \sum_{i=1}^{p} \beta_1 lnGEXPE_{t-i} + \sum_{i=1}^{p} \beta_2 lnGEXPH_{t-i} + \sum_{i=1}^{p} \beta_3 lnGFCF_{t-i} + \sum_{i=1}^{p} \beta_4 lnLABF_{t-i} + \mu_{1t} \quad (7)$$

$$lnGEXPE_t = \partial_0 + \sum_{i=1}^{p} \partial_1 lnGEXPE_{t-i} + \sum_{i=1}^{p} \partial_2 lnGEXPH_{t-i} + \sum_{i=1}^{p} \partial_3 lnGFCF_{t-i} + \sum_{i=1}^{p} \partial_4 lnLABF_{t-i} + \mu_{2t} \quad (8)$$

$$lnGEXPH_t = \emptyset_0 + \sum_{i=1}^{p} \emptyset_1 lnGEXPE_{t-i} + \sum_{i=1}^{p} \emptyset_2 lnGEXPH_{t-i} + \sum_{i=1}^{p} \emptyset_3 lnGFCF_{t-i} + \sum_{i=1}^{p} \emptyset_4 lnLABF_{t-i} + \mu_{1t} \quad (9)$$

$$lnGFCF_t = \gamma_0 + \sum_{i=1}^{p} \gamma_1 lnGEXPE_{t-i} + \sum_{i=1}^{p} \gamma_2 lnGEXPH_{t-i} + \sum_{i=1}^{p} \gamma_3 lnGFCF_{t-i} + \sum_{i=1}^{p} \gamma_4 lnLABF_{t-i} + \mu_{1t} \quad (10)$$

$$lnLABF_t = \delta_0 + \sum_{i=1}^{p} \delta_1 lnGEXPE_{t-i} + \sum_{i=1}^{p} \delta_2 lnGEXPH_{t-i} + \sum_{i=1}^{p} \delta_3 lnGFCF_{t-i} + \sum_{i=1}^{p} \delta_4 lnLABF_{t-i} + \mu_{1t} \quad (11)$$

$(\bar{R}^2)$ of 59%.

4.0 Results and Discussions

4.1 Unit Root Test Results

The result of Augmented Dickey-Fuller test for all the time series variables used in the estimation are presented in Appendix 1. From the results of unit root test, all the variables (GDPP, GEXPE, GEXPH, GFCF and LABF) were not stationary at level but after the first difference, they become stationary (that is, integrated at the first difference, I(1)). Thus, all the variables were integrated at first difference. This is because the probability value of economic growth, government expenditure on education, government expenditure on health, gross fixed capital formation and labour force are less than 0.05 critical values at first difference.

4.2 Results of Pairwise Granger Causality

The result of Pairwise Granger Causality is presented in Appendix 2. The study revealed a bidirectional relationship between economic growth and government expenditure on health and between economic growth and government expenditure on education at 5% level of significance. This conforms to the benefits of Wagner's law of increasing government expenditure. The study also revealed that gross fixed capital formation granger causes economic growth. The study also found that government expenditure on health granger causes government expenditure on education and health. There was also unidirectional relationship running from labour force to gross fixed capital formation in Nigeria. This explains the strong relationship that exists between man power training or human capital development and economic growth in Nigeria. The result of the causality test which has revealed a bidirectional relationship between human capital development and economic growth in Nigeria has validated the use of VAR approach.

4.3 Optimal Lag Selection Results

The results of VAR lag selection criteria showed in Appendix 3. The result shows that lag one (1) has the least LR: sequential modified LR test statistic (at 5% level), FPE: Final Prediction Error, AIC: Akaike Information Criterion, SC: Schwarz Information Criterion and HQ: Hannan-Quinn information criterion relative to the other lags. This implies that the best lag selection for optimal performance of the model is lag one (1).

4.4 Long-run Relationship

The Johansen hypothesized co- integration was carried out to determine the number of stationary long-run relationship among the variables included in the study. It offers two tests, the Trace statistic and Maximum Eigen statistic test, with a view to identify the number of co-integrating relationships. The results of Trace statistic and Maximum Eigen statistic test are presented in Appendix 4 and 5 respectively. Both the results from Trace statistic and Maximum Eigen statistic indicate one (1) cointegrating equation at 5% level of significance. This implies that there is long-run relationship among the variables as evidenced in Trace and Maximum Eigen statistic. This explains that there is a long-run relationship between human capital development and economic growth in Nigeria. In order to determine the nature of the long run relationship, we use the normalized Johansen co-integrating equation that is based on the lowest log likelihood. It is stated as:

GDPP= 42.76382 + 0.08444GEXPE + 0.0445055GEXPH + 0.622565GFCF + 0.00727LABF

(0.02434)	(0.01659)	(0.07141)	(0.00662)
[3.46914]	[2.71661]	[8.71813]	[8.55610]

Note: Standard Errors in parenthesis () while the t-statistic values are in brackets []

The estimated coefficient of Government Expenditure on Education (GEXPE), Government Expenditure on Health (GEXPH), Gross Fixed Capital Formation (GFCF) and Labour Force (LABF) conform to the theoretical apriori expectation of the relationships. Hence, the coefficients are also statistically significant at influencing economic growth in Nigeria at 5% level of significance.

4.5 Short-run Relationship

Given that there is long-run equilibrium relationship among the variables, error correction model was used to check the speed of adjustment and the short-run dynamics. The coefficients of the explanatory variables in the error correction model measure the short-run relationship. Thus, the first order specification of the VAR model was selected. The results are summarized in Appendix 6. The short run estimates in Appendix 6 shows that, all the variables incorporated in the model were statistically insignificant at influencing economic growth in Nigeria in the short-run at 5% level of

significance. This implies that government expenditure on education and health are long term investment as they were only found significant in the long run.

The coefficient of error correction term is significant with the expected sign and low magnitude (-0.065823). Its magnitude indicates that if there is any deviation, the long run equilibrium is adjusted slowly where about 6.6% of the disequilibrium maybe removed each period (that is, each year). The coefficient of multiple determinations (R^2) showed that explanatory variables jointly explained about 67% of the movement in the dependent variable with the R^2-adjusted (R^2) of 59%. The overall significance of the model is explained by the F-statistic of 11.308354 which is significant at 5% critical level. The result explains that human capital development has positive but insignificant impact on the growth of the Nigerian economy in the short-run.

Residual tests were conducted to see whether estimates are reliable and can yield reliable statistical inferences. The result of Vector Error Correction VEC residual serial correlation LM tests shows that there is no serial correlation at lag order 1. The model used for the study was proven dynamically stable using the result of inverse roots of Autoregressive AR characteristic polynomial. This means that results or estimates produced are reliable and can stand statistical inferences. The overall significance of the model was good indicating that the results or estimates are not spurious but valid for statistical inference.

4.6 Impulse Response/VarianceDecomposition

Since the individual coefficients in the estimated VAR models are often difficult to interpret, the practitioners of this technique often estimate the so called Impulse Response Functions (IRF) (Gujarati, 2004). Hence, the response of economic growth (the leading model) to shocks in other variables in the VAR system is considered for the analysis. The results show that when a one standard deviation shock is given in the residuals each endogenous variable in the VAR system responds significantly to the own shock. The results therefore, show the positive responses of economic growth to shocks in government expenditure on education, government expenditure on health, gross fixed capital formation and labour force.

Variance decomposition provides information about the relative importance of each random innovation affecting the variables in the VAR system. The

variance decomposition apportions the total fluctuations in a particular variable to the constituent innovations in the system. The results of variance decomposition of the leading economic growth model over 15-years showed that one standard deviation or innovation in the price of GEXPE, GEXPH, GFCF and LABF would cause 5.43%, 9.29%, 4.8% and 24.49%in the 15th year forecast. All the variables in the model exhibited increasing trend while the own shock showed a declining trend.

5.0 Conclusion/Recommendations

Based on the exploration of human capital development through government spending on education and health and the findings thereof, the study concludes that there is a clear-cut and obvious relationship between human capital development and economic growth in Nigeria in the long run and that, human capital development has impacted positively and significantly on economic growth in Nigeria. While in the short run, there is no significant relationship between human capital development and economic growth in Nigeria. To achieve a sustainable growth through human capital development, the researcher proffers the following recommendations.

i. As a drive to achieving economic growth and generally, the sustainable goals by 2030, the Nigerian government should sustain increased investment in education and health. This is a sure way of improving human capital development in the country. This would in turn transmit to the economic growth of the country.

ii. There should be more encouragement given to the private sectors in investing in education and health in order to increase their participation in the provision of human capital services to the people. Health care is therefore a special commodity. This presupposes that, government expenditure on health sector without private investment on health is inefficient in addressing health issues.

iii. Government should embark on capital projects that generate employment opportunities for Nigerian graduates. This is because, most youths nowadays engage in all sort of social vices such as armed robbery, kidnapping, prostitution, etc, since they are unemployed.

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A ppe ndix 1: R esults of U nit R oot Test

Variables	A DF w ithConstant					
	A t leve l	**First D iffer en ce**	**1% C ritical Leve l**	**5% C ritical Leve l**	**10% C ri tical Le vel**	**O rd er of Integration**
RG DP	-1.772204	-5.435899	-3.646342	-2.954021	- 2.615817	I (1)
Prob	0.3874	0.0001***				
G EX PE	-0.321894	-6.562177	-3.646342	-2.954021	- 2.615817	I (1)
Prob	0.9113	0.0000***				
G EX PH	0.004580	-6.940170	-3.646342	-2.954021	- 2.615817	I (1)
Prob	0.9528	0.0000***				
G FC F	4.677633	-3.874558	-3.646342	-2.954021	- 2.615817	I (1)
Prob	1.0000	0.0092***				
L ABF	0.309836	-6.002217	-3.646342	-2.954021	- 2.615817	I (1)
Prob	0.9754	0.0000***				

Source: Computed from the Unit Root Test (ADF)

Note: These critical values are computed from Mackinnon (1996) and if the probability value of a particular variable is less than the 5% critical value, we reject the null hypothesis of the variable having a unit root. The asterisk (*, **, ***) denotes rejection of the unit root hypothesis at 10%, 5% and 1% critical levels.

Ap p en d ix 2: Pai rwi se Gran ger Cau sality Te st R esu lts

N ull H ypot hesis:	Obs	F-S ta tisti c	Prob.
G EX P E does not Granger Ca use GD P P	33	6.81346	0.0035
G D PP does not G ranger Cause GE X PE		5.35688	0.0106
G EX P H do es not Gra nge r Cause G DP P	33	11. 73813	0.0000
G D PP does not G ranger Cause GE X PH		6.44571	0.0048
G FC F doe s not Gra nge r Cause G DP P	33	9.30345	0.0008
G D PP does not G ranger Cause GF CF		0.78930	0.4640
LA BF does not G ranger Cause GD P P	33	2.63921	0.0891
G D PP does not G ranger Cause LA BF		3.00710	0.0656
G EX P H do es not Gra nge r Cause G EX P E	33	5.50830	0.0096
G EX P E does not Granger Ca use GE XP H		1.69171	0.2025
G FC F doe s not Gra nge r Cause G EX P E	33	0.48035	0.6236
G EX P E does not Granger Ca use GF CF		1.95720	0.1601
LA BF does not G ranger Cause GE X PE	33	1.50339	0.2398
G EX P E does not Granger Ca use LA BF		0.61579	0.5474
G FC F doe s not Gra nge r Cause G EX P H	33	0.54880	0.5837
G EX P H do es not Gra nge r Cause G FCF		1.11703	0.3414
LA BF does not G ranger Cause GE X PH	33	1.21355	0.3123
G EX P H do es not Gra nge r Cause L ABF		0.36184	0.6996
LA BF does not G ranger Cause GF CF	33	10.7659	0.0003
G FC F doe s not Gra nge r Cause L ABF		1.60557	0.2187

Sou rce: Ext rac tion from E-v iews 9.5 O ut put

Appendix 3: VAR Lag Order Selection Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-195.1479	NA	5.78e-05	10.10739	10.40295	10.21426
1	61.29297	410.3054*	1.88e-09*	-0.264649*	2.099783*	0.590255*
2	101.7885	50.61943	3.63e-09	0.160574	4.593883	1.763519
3	159.2658	51.72956	4.72e-09	-0.263290	6.238896	2.087695

Source: Extraction from E-views 9.5 Output

Appendix 4: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.794965	86.84130	69.81889	0.0012
At most 1	0.439474	34.55030	47.85613	0.4720
At most 2	0.280070	15.44724	29.79707	0.7504
At most 3	0.127211	4.603402	15.49471	0.8494
At most 4	0.003430	0.113370	3.841466	0.7363

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 5: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.794965	52.29100	33.87687	0.0001
At most 1	0.439474	19.10305	27.58434	0.4066
At most 2	0.280070	10.84384	21.13162	0.6629
At most 3	0.127211	4.490033	14.26460	0.8043
At most 4	0.003430	0.113370	3.841466	0.7363

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Appendix 6: Vector Error-Correction Estimates

Variable	Coefficient	Standard errors [t-statistic]
$RGDP_{t-1}$	0.070534	(0.23924)[0.29483]
$GEXPE_{t-1}$	0.005288	(0.00460)[1.15031]
$GEXPH_{t-1}$	0.016894	(0.01368)[1.23488]
$GFCF_{t-1}$	0.007870	(0.02522)[0.31205]
$LABF_{t-1}$	0.210082	(0.20250)[1.03743]
ECM	-0.065823	(0.02901) [-2.26904]
C	0.072908	(0.02507)[2.90808]

R^2 = 0.667685?$?^2$ = 0.586656 F- statistic = 11.308354