IS THERE ANY MISSING LINK IN THE NEXUS BETWEEN HUMAN CAPITAL DEVELOPMENT AND ECONOMIC GROWTH IN DEVELOPING ECONOMIES? EVIDENCE FROM NIGERIA*

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1 Introduction

Previous studies have acknowledged human capital as a major variable in achieving sustainable economic growth in both developed and developing economies. However, the traditional growth theories have been queried because expansion in educational enrolment rate has not significantly guaranteed a long run growth as this has spurred the need for human capital development as a major variable in the new growth theories.

Prior to the evolution of the new growth theories, both classical and neoclassical growth models recognized human capital as a factor-input in production function. Hence, Smith (1776) saw human capital as a labour and a factor of production.

The neoclassical growth models pioneered by Solow (1957), on the other hand incorporated human capital into production as an additional input with the introduction of constant technological progress as main determinant of economic growth. However, the inability to explain long-run growth and growth differences among nations led to the emergence of the new growth theory that placed emphasis on increasing technological progress and its effects on human capital. Becker (1964), Schultz (1961), Mincer (1970, 1974) also recognized the importance of investment in education and training through formal and informal education as well as the building of the stock of skills and abilities over time to affect output and labour productivity. In their studies, three measures of human capital – output, expenditure and income approach were used. The output measure of human capital used school enrollment rate, average years of schooling and others, while the expenditure approach used the individual or government cost incurred to provide the education and training, but the income approach used per capita income, earnings, normal wages, income policy and others (Mulligan & Sala-i-Martin, 1995).

With the endogenous growth theories of the 1980s and 1990s approached by Lucas (1988), Romer (1990), Rebelo (1991) and others, human capital was proxied by educational enrollment rate and health expenditure with emphasis on increasing

* Paper published in Acta Universitatis Danubius. Oeconomica - special issue, 2019
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technology progress as a major determinant of a long run economic growth for any nation.

Hence developing countries, including Nigeria, specifically incorporate human capital in the form of education and health policies to accelerate economic growth, as advocated by the endogenous growth theory. For instance, the education sector witnessed Free Universal Primary (UPE) education in 1976, expansionary education reform in terms of increase in education budget at all tiers of government, which accounted for 55 percent enrolment increase between 1980 and 1998 and further increase to 39.4 percent enrolment between 1999 and 2013 (CBN, 2015).

Also, the health sector initiated various national and state health policies to actualize Universal Health Coverage (UHC) such as the primary, secondary and comprehensive health care scheme, National Health Insurance Scheme (NHIS) launched in 1999 and fiscal health budget. Between 2002 and 2007, the government expenditure on health as a percentage of total government expenditure increased from 3.3 percent to 9.4 percent but recently dropped from 6.7 percent to 4.7 percent between 2012 and 2017.

Despite the use of education and health sector reforms as proxy for human capital, the GDP growth rate increased from 3.1 percent between 1990 and 1994 to 6.5 percent between 2000 and 2004 but dropped from 6.3 percent between 2005-2009 to 5.7 percent between 2010 and 2014 in Nigeria (Ajakaiye, Jerome, Nabena and Alaba, 2016).

Several empirical studies have assessed the contribution of human capital to economic growth in Nigeria, however, their outcomes had been divergent. For example Ojo and Oshikoya (1995), Imoughele and Ismailia (2013), Obi and Obi (2014), Garba (2002), Ishola and Alani (2012) and Dauda (2010) employed outcome approach as a measure of human capital while Adelakun (2011), Ogujiuba (2013), Eighiremolen and Anaduaka (2014), Babasanya, Ogunleye and Ogunyomi (2017) and Osoba and Tella (2017) used expenditure approach as a proxy for human capital. However, recent studies of Adams (2003), Mba, Mba, Ogbuabor and Ikpegbu (2013), Olalekan (2014), Lawanson (2015) and Oluwatobi and Ogunrinola (2016), employed both output and expenditure approaches as measure of human capital. Dauda (2010), Eighiremolen and Anaduaka (2014), Babasanya, Ogunleye and Ogunyomi (2017) adapted the Solow neoclassical growth model. In addition, simple regression, time series ordinary least regression and panel OLS were their methodology employed. While Olalekan (2014) and Osoba and Tella (2017) recently measured human capital as the product of education and health expenditure or the interactive effect, unlike previous studies that measured human capital from individual effect.

Unfortunately, none of these reviewed studies measured human capital or human capital development from the perspective of developing economies that lack adequate physical capital which should enhance the potential of ideal human capital resources. Based on the gap identified from existing studies, this study explored the missing link in the nexus and direction of causality between human capital development and economic growth using the income measurement approach.

2 Literature Review

Conceptual Review

Theoretically, the term human capital development has been widely misconceptualized as human capital. The term human capital simply refers to the stock of competencies, skills, knowledge and other attributes embodied in individuals or groups of individuals acquired to influence productive capacity of a nation in an idea society (OECD, 2011).

On the other hand, human capital development also refers to the stock of competencies, skills, knowledge and other attributes embodied in individuals or groups of individuals acquired to influence productive capacity of a nation with adequate physical infrastructural such as transportation, communication, availability of internet and others. Most developing economies lack their basic infrastructure which affects the productive capacity of their human capital. Conclusively, human capital development is the problem of developing economies as against the perception of human capital as education and health expenditure or educational enrollment rate (Pettinger, 2017; Ritter, 2018).

Theoretical Review

The classical economic growth theories pioneered by Smith (1776) first acknowledged the role of labour size as a determinant of economic growth. However, in the early nineteen century, Harrod-Domar (1940) emphasized on savings and physical capital investment accumulation as main determinants of economic growth. Todaro and Smith (2011) on the other hand argued that savings and investment are necessary conditions for accelerated rates of economic growth but not sufficient for sustainable development. The sufficient conditions include well-integrated financial and capital markets, highly developed transport facilities, a well-trained and educated workforce, good and efficient governance capable of converting new capital effectively into higher sustained output level.

The neoclassical growth theory developed by Solow-Swan (1956) introduced technological progress, often known as exogenous factor to consolidate the Harrod-Domar growth weaknesses. In the same vein, they accepted that labour and physical capital are main determinants of economic growth but with more emphasis on constant technological progress which is expressed in the Cobb-Douglas production function as: $Y= At\ K^{\alpha}\ L^{1-\alpha}$. Also, Solow-Swan (1956) assumed a steady-state economy, implying that both labour size and technology level remains constant.

Unfortunately, the diminishing returns to capital investment failed to provide a long-run economic growth for any nation as had been argued that physical capital alone cannot achieve economic growth and thus led to the emergence of endogenous growth theories.

Following the weaknesses of Harrod-Domar and Solow-Swan growth theories to explain the long run economic growth determinants in their models and the assumption of physical investment only as a determinant of economic growth, Romer (1990) pioneered the endogenous growth theories with the introduction of technological progress. In addition, he assumed an increasing technological progress to explain the long-run economic growth. More importantly, Lucas (1988) also

introduced human capital into this existing endogenous Cobb-Douglas production function expressed as:

$$Y=F(A,K,H,L)$$

Lucas (1988) on the other hand explained in his model how increasing technological progress will enhance human capital, physical capital and labour productivity and eventually result in a long-run economic growth for any nation.

Empirical Review

There are several studies on the nexus between human capital and economic growth in developed and developing countries but very few studies examined the relationship between human capital development and economic growth from the perspectives of deficiencies in physical infrastructure (capital) in most developing economies.

Adelakun (2011) conducted a study on human capital development and economic growth using classical regression technique. In this study, economic growth is proxied by GDP while the human capital is proxied by total government expenditure on education and health, and the enrollment pattern of tertiary, secondary and primary schools. The study concluded that there is a positive relationship between human capital development and economic growth.

Ishola and Alani (2012) on the other hand examined the relationship between human capital development and economic growth employing time series econometric technique and a Solow Augmented model. In the study, the dependent variables is measured by GDP per growth while the independent variables include growth rate of labour, growth rate of capital, Structural Adjustment Programme and the human capital output method – Life literacy rate and Adult literacy rate. The study also concluded that human capital has a positive relationship with economic growth in Nigeria.

Oluwatobi and Ogunrinola (2011) also investigated the implication of government expenditure on human capital development for economic growth in Nigeria adopting the Solow Augmented model in their OLS estimation. Unlike previous studies, they considered the product of human capital and labour size (hL), physical capital, recurrent and capital government expenditure on education as independent variables while the dependent variable is measured by real GDP. Their result concluded that a long-run relationship exist between human capital development and economic growth.

Ogujiuba (2013) examined the impact of human capital formation on economic growth in Nigeria using Error Correction Model. Unlike previous studies, this study considered only expenditure on education as human capital as well as the three tiers enrollment rates and the real gross capital formation as the independent variables while real GDP growth is proxied as the economic growth. He concluded that recurrent expenditure on education has a positive significant impact on economic growth as against capital expenditure. However, the result confirmed that human capital formation did not guarantee a long run economic growth.

In the study by Mba, Mba, Ogbuabor and Ikpegbu (2013) on human capital development and economic growth in Nigeria, the study employed OLS technique

and exogenous growth model. The economic growth is proxied as real GDP per capita while primary school enrollment, life expectancy, public expenditure on education and health are proxied as the human capital and the stock of physical capital is proxied as capital formation. The study found that the human capital variables were significantly related to economic growth within the period 1977-2011 in Nigeria.

Similarly, Eighiremolen & Anaduaka (2014) investigated the impact of human capital development on national output, using quarterly time series data from 1999 to 2012 in Nigeria. Also, they employed Solow Augmented growth model and OLS technique. The human capital development was measured by the combination of capital and recurrent expenditure government expenditure, without considering health expenditure. They found a positive relationship among all the independent variables on economic growth in Nigeria.

A recent study by Olalekan (2014) examined the impact of human capital on economic growth in Nigeria using a Generalized Method of Moment (GMM) for an annual data from 1980 to 2011. He pioneered the use of human capital measure as health adjusted education which is obtained by the product of primary enrollment rate and ratio of health expenditure as percentage of GDP. His results found that health adjusted education proxied as human capital has a higher input on economic growth. Thus, his study confirmed the simultaneous role of education and health expenditure on economic growth in Nigeria.

Also, Osoba and Tella (2017) in their study, human capital variables and economic growth in Nigeria also considered the importance of interaction between education and health expenditure. The theoretical framework adopted was Solow Augmented production function. Also, the study used annual time series for the period 1986-2014. In addition, the study employed Fully Modified OLS (FMOLS) technique for the annual period of 1986-2014. The human capital is proxied by government expenditure on education and health separately, interaction between government expenditure on education and health while government capital formation as the physical capital. Also, the dependent variable, economic growth is proxied by real GDP. Their results found that the interaction effect of human capital caused a long-run economic growth.

In contrast, Ekperiwase, Olutayo & Egbetokun (2017) examined human capital and sustainable development in Nigeria using an endogenous growth model. They employed a descriptive statistics and vector autoregression (VAR) econometric technique for an annual data series spanning the period 1981-2014. Their outcomes found that human capital reduces environment degradation but increases economic growth in Nigeria for the covered period. Similarly, the study of Babasanya, Ogunleye and Ogunyomi (2017) also examined the role of human capital development as a catalyst for environmental sustainable development in Nigeria using VECM approach. Unlike previous studies, the theoretical framework employed Lucas production function to capture long run effect using the increasing technology progress as endogenity variable. In their study, human capital development is proxied as summation ratio of government expenditure on education, health and

telecommunication to total public expenditure while human capital is proxied as the ratio of public expenditure on education to total public expenditure, the physical expenditure is proxied as economic infrastructure, measured ratio sum of public housing and road construction to public expenditure and the endogenous technology progress (A) as the control variables include GDP growth rate, HCD and institutional quantity. Their outcomes found that HCD has the strongest exogenous effect to enhanced environmental sustainable development in the short run while in the long run, HCD is weak and contributed insignificant impact on environment sustainable development.

In summary, the empirical studies reviewed above have shown that human capital development had not been measured for the developing countries that lack basic infrastructure investment that enhances human capital investment effectiveness and efficiency, in terms of long run economic growth. Therefore, this study would put emphasis on human capital development rather than human capital.

3 Methodology

The theoretical framework of Lucas Cobb-Douglas production function rooted from the endogenous growth theory was adapted to account for the missing link between human capital development and a long-run economic growth in developing economies in this study. Specifically the Lucas Cobb-Douglas production function is expressed as:

$$Y = f(K, H, L, A) \tag{1}$$

where: Y, K, H, L, A are the aggregate production of the economy proxied as real GDP growth rate, human capital, physical capital, labour size and the total factor productivity (TFP) respectively.

This specification takes into account the determinants of economic growth in the developing economies, like Nigeria which is not a steady state but largely depends on the increasing technological progress effect on the main variable, human capital development in this study. Also, following similar works of Joshua (2016) and Essardi & Razzouk (2017), the increasing technological progress (A) proxied in this study represents the missing link and justification for the included variables as specified in equation (2):

$$A = f(GI, FDI, TOS, INFL, GINI, GDP) \tag{2}$$

where *GI* is proxied by governance Indicator. In this study, the governance indicator is decomposed into institutional quality index, educational curriculum development and intellectual property & rights. While foreign direct investment (FDI), trade openness (TOS), inflation rate (INFL) and gross domestic product (GDP) are the composition of economic indicator and finally, income inequality represent the social indicator.

In order to determine the nexus between human capital development and economic growth, a simple OLS technique is employed. The econometric equation derived from equations (1) and (2) are stated as:

$$\begin{aligned} RGDP = {} & \alpha_0 + \alpha_1 K_t + \alpha_2 H_t + \alpha_3 L + \alpha_4 H_t K_t + \alpha_5 GI_t \\ & + \alpha_6 FDI_t + \alpha_7 TOS + \alpha_8 INFL_t + \alpha_9 GINI_t + \alpha_{10} GDP + U \end{aligned} \tag{3}$$

where the H_t K_t, GI_t, FDI_t, TOS_t, $INFL_t$, $GINI_t$ and GDP_t are regressors of the real gross domestic product. In addition, this study used the income approach in measuring human capital represented by GDP per capita as average standard of living of the human capital in the economy.

To ascertain the long-run movement of the included variables irrespective of their stationarity order level, the cointegration test is conducted to justify the long-run effect of these included variables and confirm the presence of long-run economic growth estimation. Therefore, the use of unit root and cointegration tests confirmed the properties of time series econometric technique and thus makes OLS estimations free from spurious results and also make the inference reliable for policymakers. Finally, the annual dataset used in this study are sourced from the World Development Index (WDI) (2017), CBN Statistical Bulletin (2016) and Worldwide Governance Indicator (WGI) (2016) for the period 1985-2016. In summary, table 1 shows data description and sources:

Table 1: Data description and sources of variables

S/N	Variable	Description	Variable Notation	Source
1.	Economic growth	This is measured by the real gross domestic product (GDP) at constant price.	RGDP	CBN Statistical Bulletin
5.	Physical capiatl	Physical capital is measured as a percentage of gross fixed capital formation over GDP.	K	CBN Statistical Bulletin 2016
6.	Labour siz	Labour size is represented by number of working population in the country.	L	WDI 2017
7.	Human Capital Development	Human capital development is measured as the human capital in developing countries. In this study, HCD is proxied as the interactive variable. In income measurement approach, HCD is the interaction between gross domestic product per capita and the physical capital.	HCD	WDI 2017, CBN Statistical Bulletin
8.	Institutional Quality	Institution quality is one of the government indicators. To measures the qualitative score	IQ	World Bank Governance Indicators (WGI) 2016

		derived from worldwide government indicators (WGI).		
9.	Intellectual Property and Right	Intellectual property and right is another governance index that measures the regulatory quality which ranges from 0 to 100. The lower the value, the lesser the regulatory quality and vice-versa in the country.	IPR	World Bank Governance Indicators (WGI) 2016
10.	Curriculum Development	Curriculum development is another governance indicator that measures government effectiveness in terms of quality of Civil service. Also, it ranges from lowest value (0) and the highest value (100).	CD	World Bank Governance Indicators (WGI) 2016
11.	Foreign Direct Investment	Foreign direct investment is the monetary value of direct investment in the country. This is one of the economic indicators in this study.	FDI	CBN Statistical Bulletin 2016
12.	Trade Openness	Trade openness is measured as sum of import and export over GDP. This is an economic indicator.	TOP	CBN Statistical Bulletin
13.	Inflation rate	Inflation rate is measured as elasticity of consumer price index, expressed in percentage.	INFL	CBN Statistical Bulletin
14.	Gross Domestic Product	Gross domestic product is the monetary value of economic activities in an economy	GDP	CBN Statistical Bulletin
15.	Gini index	Gini index (GINI) used to proxy income inequality. It is one of the socio-economic indicators. The Gini index of 0 represents	GINI	World Income Inequality database 2017

		perfect equality while an index of 100 implies perfect inequality.		
16.	Gross Domestic Product Income	Gross domestic product per income is computed by the ratio of gross domestic product over the population size.	GDPI	CBN Statistical Bulletin & UNCTAD 2017

Source: Author compilations

**** Note: The missing observations in the any of the time series was generated***

4 Empirical Results and Analysis

Result of HCD-Economic Growth: Income Approach

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Jarque Bera	Observation
LNRGDP	3.39	0.514	2.7	4.23	3.00 (0.22)	32
GDPI	0.138	0.178	0.002	0.52	8.19 (0.010)	32
LNK	5.925	2.445	1.72	9.55	1.58 (0.45)	32
LNL	10.58	0.22	10.31	10.93	2.41 (0.30)	32
HCD	1.19	1.71	0.003	4.97	9.50 (0.00)	32
IQ	19.02	4.53	7.88	27.01	0.13 (0.94)	32
IPR	10.76	2.69	5.45	15.87	0.97 (0.62)	32
CD	15.73	3.04	8.61	21.08	3.39 (0.18)	32
LNFDI	4.56	2.36	-0.84	7.22	3.46 (0.18)	32
TOP	399.25	151.87	114.62	687.71	0.97 (0.61)	32
INFL	19.56	18.97	4.7	72.9	14.23 (0.00)	32
LNGDP	1.67	2.10	-2.04	4.56	1.93 (0.38)	32
GINI	47.01	3.72	40.06	50.60	6.53 (0.04)	32

Source: Author compilation from Eviews output

Table 2 also shows the descriptive statistics of each included variable in this study. The result revealed that gross domestic product per capita (GDPI) has the lowest variability (0.178) while the highest variability is in trade openness. In addition, the Jarque-bera test found that among these variables, gross domestic product per capital (GDPI), human capital development (HCD), inflation rate (INFL), and GINI were normally distributed in this study

Table 3: Correlation matrix

	LNRGDP	GDPI	LNK	LNL	HCD	IQ	IPR	CD	LNFDI	TOP	INFL	LNGDP	GINI
LNRGDP	1.0000												
GDPI	0.9090	1.0000											
LNK	0.9791	0.8778	1.0000										
LNL	0.9842	0.8896	0.9833	1.0000									
HCD	0.8846	0.9981	0.8505	0.8621	1.0000								
IQ	0.5493	0.6082	0.5588	0.5261	0.6067	1.0000							
IPR	0.5064	0.5303	0.5190	0.5191	0.5278	0.6473	1.0000						
CD	-0.4419	-0.3485	-0.4848	-0.5030	-0.3350	-0.1494	-0.2187	1.0000					
LNFDI	0.8876	0.6831	0.9400	0.9094	0.6426	0.4210	0.4035	-0.4712	1.0000				
TOP	0.1779	-0.1921	0.2416	0.1895	-0.2433	-0.0489	-0.0512	-0.0438	0.4970	1.0000			
INFL	-0.4125	-0.3587	-0.3676	-0.4458	-0.3430	-0.1800	-0.2626	0.3754	-0.2805	-0.0515	1.0000		
LNGDP	0.9525	0.8235	0.9880	0.9759	0.7909	0.4831	0.4774	-0.4934	0.9669	0.3169	-0.3571	1.0000	
GINI	-0.2551	0.0573	-0.1894	-0.2097	0.0979	0.1513	0.0785	-0.1969	-0.3350	-0.6347	0.0014	-0.2235	1.0000

Source: Author compilation from Eviews output

In table 3, it is evident that there is a high positive degree of correlation between the dependent variable, real GDP and the included independent variables. Also, curriculum development, inflation rate and GINI index exhibited a negative association with the dependent variable over the period 1985-2016 in Nigeria. Specifically, the labour size variable is excluded from the included independent variables to reduce the multicollinearity problem and achieve a non-spurious OLS result in this study.

Table 4: Unit root test using Phillips-Perron method

Variables	Trends & Intercept		Integrate Order
	1st Diff.	2nd Diff.	
LNRGDP	-9.71***(0.00)	—	I(2)
GDPI	-4.83***(0.00)	—	I(1)
LNK	-4.71***(0.00)	—	I(1)
HCD	-4.70***(0.00)	—	I(1)
IQ	-10.40***(0.00)	—	I(1)
IPR	-10.42***(0.00)	—	I(1)
CD	-12.06***(0.00)	—	I(1)
LNFDI	-10.77***(0.00)	—	I(1)
TOP	-12.54***(0.00)	—	I(1)
INFL	-6.61***(0.00)	—	I(1)
LNGDP	-6.62***(0.00)	—	I(1)

GINI	-4.68***(0.00)	—	I(1)

Source: Author compilation from Eviews

Note (a): ***, ** and * significant at the 1%, 5% and 10% level

Table 4 also revealed that all the included variables were stationary at first difference leve, I(1) except real gross domestic product (rgdp) which becomes stationary at 2nd difference level, I(2). Also, the integrate order of two, I(2) becomes the integrate order of one, I(1) since it has the lowest AIC statistics (Pearson et al. 2001). Therefore, it is evident that all the included variables have same integrate order of one, I(1).

Table 5: Residual cointegration test

Variable	Trend & Intercept	Integrate Order
Resid 01	-4.80***(0.003)	I(0)

Source: Author compilation from Eviews

Note (a): ***, ** and * significant at the 1%, 5% and 10% level

Table 5 shows that the residual variable is stationary at integrate order of zero, I(0) and thus it established a long-run relationship among the non-stationary variables in this study.

Table 6: Estimated long-run OLS

OLS					
Variable	**1**	**2**	**3**	**4**	**5**
GDPI	0.623 ***(0.004)	11.11 ***(0.002)			
LNK	0.166 ***(0.000)	0.088 ***(0.003)			
HCD		-0.993 ***(0.000)	0.24 ***(0.000)	0.112 ***(0.000)	0.186 ***(0.00)
IQ			0.002 (0.91)	-0.003 (0.67)	0.0051 (0.20)
IPR			0.007 (0.73)	0.002 (0.87)	-0.0004 (0.94)
CD			-0.028 *(0.08)	-0.004 (0.64)	-0.0161 ***(0.005)
LNFDI				0.073 (0.23)	0.046 (0.19)
TOP				0.0006 *(0.07)	0.0002 (0.41)
INFL				-0.002 (0.16)	-0.0015 **(0.04)
LNGDP				-0.003 (0.97)	0.026 (0.58)
GINI					-0.030 ***(0.000)
C	2.32 ***(0.00)	2.52 ***(0.00)	3.43 ***(0.00)	2.70 ***(0.00)	4.45 ***(0.00)
R-Squared	0.969	0.978	0.808	0.968	0.99

DW	0.37	0.67	0.201	0.875	1.81
N	32	32	32	32	32
F-Statistics	460.68 ***(0.00)	408.91 ***(0.000)	28.40 ***(0.00)	87.75 ***(0.00)	245.09 ***(0.00)

Source: Author compilation from Eviews

Note (a): ***, ** and * significant at the 1%, 5% and 10% level

Table 6 presented the long run OLS estimates of human capital development from income approach and economic growth in the five (5) OLS models. In OLS 1 model, the result found a high positive significant impact of human capital proxied as gross domestic product per capita on economic growth in Nigeria. This means that one percent increase in gross domestic product per capita leads to 62.3 percent increase in economic growth in Nigeria. This result confirmed the existing microeconomic studies of (Becker, 1964; Mincer, 1970, 1974) that attributed the significant of per capita income or earnings or other income policy as a major determinant of economic growth, unlike previous output and expenditure human capital approaches impact on economic growth. Furthermore, the OLS 2 model that included human capital development, proxied as interaction of gross domestic product per capita and physical capital, found that all included regressors have positive significant impact on economic growth over the study period in Nigeria. Although, the gross domestic product per capita that is proxied as human capital found a higher multiplier impact of 1111 percent than the human capital development coefficient of 99.3 percent on economic growth, implying that lack of combination of physical capital and human capital hinder economic growth in Nigeria.

More importantly, the OLS 3-5 models considered the variables not captured in human capital development of the nexus between human capital development and economic growth in Nigeria. In both OLS 3 and 4 models, it was found that among these regressors only human capital development was statistically significant determinant of economic growth in the long run in Nigeria. Also, the OLS 5 model found that human capital development, curriculum development, inflation rate and GINI index were statistically significant determinants of economic growth over the period 1980-2016 in Nigeria.

In addition, the overall models were statistically significant at 1 percent and only OLS 5 model is free from serial autocorrelation problem in this study. It is evident therefore that human capital development using income approach relatively depend on governance, economic and social indicators as the missing link variables in achieving a long run economic growth .

Test of Causality between Human Capital Development and Economic Growth

This study empirically tested the causal relationship between human capital development and economic growth to ascertain the direction of causality between human capital development and economic growth using the Granger causality test. The following results were obtained as in table 7 below:

Table 7: Results of pairwise granger causality tests

Sample: 1985-2016				
Lags: 2				
Human Capital Measurement	**Causal Direction**	**Nature of Causal Direction**	**F-statistics**	**Pvalue**
Income Approach	HCD ⟷ RGDP	Bidirectional causality	3.548 (1, 30) 2.797 (1, 30)	0.03** 0.04**

Source: Author compilation from Eviews

Note (a): ***, ** and * significant at the 1%, 5% and 10% level

The Granger causality estimation technique using the income approach between human capital development and economic growth revealed bidirectional causality between human capital development and economic growth at 5 percent significant level in Nigeria, implying that economic growth could also lead to human capital development (HCD) and vice-versa.

5 Conclusion

The nexus between human capital development and economic growth has been much debated over the years. Using the income measurement approach, the study examined the nexus and causality between human capital development and economic growth in the long run economic growth. The results of the long run OLS estimates concluded that human capital development, curriculum development, inflation rate and GINI index were consistent variables that were missing in previous studies in achieving a long run economic growth within the study period in Nigeria. This implies that governance, economic and social indicators are prerequisites for a positive and significant relationship between human capital development and economic growth. The study also established a bidirectional causality between human capital development and economic growth using income approach as against unidirectional relationship found previous studies using output and expenditure approaches. These provide the missing link in the nexus between human capital development and economic growth in Nigeria.

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