Human Capital Development and Economic Growth in Nigeria

J. O. Ojenike[1] & *O. A. Shodiya[2]
[1]Department of Business Administration, Ajayi Crowther University, Oyo State, Nigeria
[2]Department of Business & Finance, Crescent University, Abeokuta, Nigeria

*Corresponding Email Address: olayinkashodiya@yahoo.com

Abstract
This study examined the effects of human capital development on economic growth in Nigeria from 1981 to 2021. The goals are to define the patterns in human capital development and economic advancement, assess the impact of these trends, and establish a causal link between these trends and economic growth. The Central Bank of Nigeria (CBN) collected further information on administrative expenditure on education, government expenditure on health, and real gross domestic product from the Statistical Bulletin (a number of publications). The data set's stationarity was evaluated using the unit root test (Augmented Dickey-Fuller) unit root test. The Granger pairwise causality evaluation was used to evaluate the directions of loss among the variables, while the Engle-Granger single equation Cointegration assessment was utilized to determine the long-term correlation between the variables. The Cointegration test's outcome showed that the qualities' cointegrating correlation was nonexistent. Additionally, the results of the Ordinary Least Squares (OLS) regression estimate showed that the growth of the economy in Nigeria is relevantly influenced by administrative expenditures on health as opposed to education. The results of the causation test also showed that the expansion of the Nigerian economy was caused by administrative costs for health and education. The study came to the conclusion that administrative spending on health and education had a positive and significant impact on economic growth in Nigeria. Therefore, it was suggested that the government should cautiously implement policies to promote human capital development in order to spur economic growth, invest in education because it is an engine for economic growth, support the health sector by supplying all hospitals with cutting-edge technology that can keep up with that used in advanced nations.

Keywords: Human Capital Development, Economic Growth, Human Resources, Economic Development

1.0 Introduction

Any nation's most valuable resources are its people. This asset needs to be handled appropriately if development and growth are to be achieved. The provision of education and health care services to human beings is regarded as the best way of enhancing economic upturn (Idenyi, Eze & Ogbonna, 2016). Economists have an enduring awareness for the relevance of human resource progress in the industrialization and development process. For instance, Adam Smith (1776) particularly added the acquired and beneficial abilities of all the inhabitants or members of the society to his definition of fixed capital in addition to underlining the need of education at various points in time in his magnum opus. Alfred Marshal (1890) likewise stressed the value of education as a national undertaking and saw it as the most precious of all assets invested in people.

Human capital development refers to the process of acquiring and increasing the number of people who have the education, experience, and skills that are essential for the growth of the economy and development of a country's economy. The term "human capital" refers to the qualifications and skills of human resources

of a nation (Okojie, 2005). Additionally, according to Ejere (2011), human capital refers to the human aspect in the production process and is made up of the workforce's collective knowledge, skills, or competencies, and talents.

According to Kanayo (2013), human capital development (HCD), which comprises labor and employment, education, health, and women's issues, is essential to a nation's socioeconomic progress. Because it aims to ensure that the nation's human resource endowment is aware, competent, flourishing, and healthy to enable the best exploitation and utilisation of other resources to foster growth and development, investing in human asset development is crucial. However, no country has ever had long-term economic success without making significant investments in its human capital. Temple (1999), Barro and Salai-i-Martin (1995), to name a few, have investigated the channels via which human capital might influence growth. A significant portion of these literatures have emphasized the complimentary relationship between physical and human capital, pointing out how imbalances in these two stocks as well as human capital externalities can have an impact on economic development. When it comes to understanding and converting new or existing designs into production processes, technicians and scientists tend to have the largest comparative advantage among highly educated groups.

The growth theory (Romer, 1986; Lucas, 1988) has emphasized the connection between economic growth and human capital development. Fascinating in their work was the notion that, over time, output per unit of input could rise even when inputs were fully accounted for. Technically speaking, this source of growth appears to include greater human capital and an increasing amount of knowledge. The asset of knowledge, skills, social skills, and personality traits, such as creativity and cognitive ability that are integrated into its potential to perform labor and produce economic value is known as human capital (Adelakun, 2011).

When compared to other developing nations, Nigeria is typically characterized by its low levels of literacy, low income, subpar healthcare system, gender disparity, and low standard of living (Todaro and Smith, 2011). The government in these developing nations is infamous for providing poor and insufficient health care and education, and the countries' infrastructure requirements for enhanced human capital growth are also glaringly lacking. People's productivity levels are stalled as a result of the low rate of human capital growth, which causes a variety of socioeconomic problems like poverty and unemployment in society. These problems have become increasingly severe over time in many developing nations, particularly those in Sub-Saharan Africa. Conversely, nations with enough levels of developed human capital gain from a wide range of advantages, including fewer hardships, impartial income and wealth distribution, more employment possibilities, gender equality, and rates of sustainable economic growth. Along with having a high death rate and a short life expectancy, countries with weak human capital development also have certain demographic characteristics (Ogunleye, Owolabi, Sanyaolu and Lawal, 2017).

Economic growth is the gradual rise in the volume of products and services an economy produces over time. It is often calculated as the real gross domestic product (real GDP) growth rate as a percentage. Gross Domestic Product (GDP) or Gross National Product (GNP) changes can be used to calculate economic growth (Idenyi, Eze, and Ogbonna) (2016). An essential indicator of sustainable development is economic growth. It will be challenging for a developing nation to raise the standard of living for its expanding people without economic growth. One aspect of economic growth that can be attained is the improvement of education and health services, as well as the development and maintenance of infrastructures, as well as the promotion of both domestic and international investment (Saad and Kalakech, 2009). As a result, this demonstrates that equitable and sustained economic growth is unquestionably a key goal of public expenditure policy. Numerous government initiatives are specifically designed to encourage steady and equitable economic growth. Over time, the emergence of physical and human assets can and has been

significantly influenced by public expenditures. When shortages of trained labor or infrastructure become a significant barrier to a rise in production, appropriate public spending can be beneficial in boosting economic development, even in the near term (Idenyi et al., 2016).

Spending greater money on the education and health sectors has been a top priority for the country. According to analysts, in order for Nigeria to achieve its 2020 goal of becoming one of the world's top economies, efforts must be made to put the government's plans for the development of human capital into action so that they can support the expansion of the country's economy as a whole. Due to this, the federal government has been convening to discuss potential options for managing human capital development so that it may significantly advance the Nigerian economy. The purpose of this study is to examine the effects of human capital development on economic growth in Nigeria in light of the aforementioned problems.

Nigeria is still incredibly fortunate to have a wealth of material and people resources, which, if used effectively, would propel the economy into the forefront and advance economic progress. Nigeria has not reached its full development potential in terms of sustainable human capital growth or people-oriented development despite all the abundant resources the country has been blessed with, unlike many other potential economies around the world that have adopted a similar strategy to boost their economic growth. A significant portion of Nigeria's estimated 193.4 million population, which has poor levels of literacy and frequently has insufficient access to education and healthcare, according to the World Bank (2016) (Ogunleye et al., 2017).

The Nigerian Vision 20:2020 document from 2010 acknowledges the general decline in school infrastructure. Less than 30% of eligible secondary school students in the 14–17 age range are enrolled in schools countrywide, which is a serious cause for worry. The issue is extremely concerning for adult literacy and tertiary education in Nigeria. The health section has similar difficulties. Primary healthcare institutions make up 85.8% of the total healthcare spending in the nation; these are primarily health posts and dispensaries, which due to inadequate funding can only offer the most basic curative services. More than 60% of Nigeria's projected $10 per capita health expenditure comes from private out-of-pocket spending, which worsens inequities in access to high-quality healthcare.

Nigeria's human development index is much lower than that of the majority of developing nations in Africa and Asia (United Nations Development Program, 2009). Nigeria is ranked tenth among the selected developing nations and 158th overall out of 182 nations. Nigeria is currently experiencing severe underemployment and unemployment difficulties in the area of job security. According to the Next Generation report, three out of ten Nigerians are currently unemployed. Three out of 10 college grads are unemployed, and the unemployment rate for those with a secondary degree is nearly as high. According to reports, the percentage of graduates working in technical and professional fields is rapidly declining.

Numerous studies have been conducted on the effect of human capital development on economic growth, but there aren't many in Nigeria's extant literature, and even among them, the model specifications and estimating methods used led to contradicting results that created a vacuum that needed to be filled. For instance, research like Kairo, Mang, Okeke and Aondo (2017) found that human capital development does not have a relevant influence on economic growth in Nigeria, however Idenyi et al. (2016) and Adelakun (2011) found that human capital development had a relevant effect on economic growth. Based on these contexts, this research work aims to close the identified gap and examine the impact of human capital development on economic growth in Nigeria.

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Human Capital

The founding theory of this association dates back to the pioneering work of Mincer (1958), Schultz (1961), and Becker (1962), the pioneer who believed that human capital is similar to physical capital and that one can invest in it through education, health, and training which, in turn, will raise profit and contribute to economic growth. As a result, it is widely acknowledged that human capital can be considered to be one of the primary drivers of economic growth (Mankiw, Romer, and Weil, 1992; Barro, 2001), and it has also been noted to be a crucial component in enhancing the impact of other factors thought to be crucial for economic growth, such as investment in technology (Romer, 1990; Aghion and Howitt, 2004). (1998).The skills, education, capacity, and characteristics of labor that affect their level of productivity and earning potential are measured as human capital. Human capital is described by the OECD as "the skills, knowledge, competencies and other traits embodied in individuals or groups of individuals adopted over their life and used to process products, services, or ideas in market settings. "Individual human capital, on one hand, is the term for the knowledge and skills of each worker while economic human capital, on the other hand, is the collective human capital of an economy, which is determined by national educational requirements.

A citizen's skill set is valued economically by their human capital, which is measured. This measure expands upon the fundamental production component of the citizen measure, which holds that all citizens are created equal. The idea of human capital recognizes that not all citizens are created equal and that investing in them can raise their quality of life. The nation and its economy as a whole can benefit from the education, experience, and skills of its citizens. (Investopedia). Theodore Schultz in 1960 described human capital as the worth of a person's abilities. He held that investing in human capital through education, training, and better benefits might increase the amount and quality of production, just as investing in other types of capital. People and leaders who make up a country's human capital are essential to its development since it is frequently believed that a country is only as good as its people and leaders. Migration of human capital is common, especially in economies that are global. Because of this, this form of capital will shift from underdeveloped or rural areas to metropolitan and better-developed areas. This phenomenon has been referred to as a brain drain, making affluent places richer and impoverished places poorer. The gross future earnings potential of the working-age population can be used to calculate human capital in financial terms.

2.1.3 Growth in the economy and human capital

It is a significant departure from traditional welfare economics, which associates human welfare with utility, to place human talents at the center of the aims for the advancement of human society (Sen, 1999). The more direct human desires of agency and freedom are not adequately reflected in rational behavior, which is thought of as being driven by utility maximization. Sen's capacity approach was changed to focus on the direct achievements of individuals in terms of entitlements, capabilities, and freedom rather than the conventional metrics connected to growth in per capita income, utility costs, and food availability. Although countries may have the same amounts of per capita income, human development varies amongst them despite the fact that human capabilities are not independent of income growth. Human growth is the expansion of people's options so they can live better, longer, and more fulfilling lives. But expanding decision-making entails a complicated set of processes, from expanded input provision to institutional setups that are expected to translate inputs into actual available options.

According to research (Okojie, 1995; Oluwatobi & Ogunrinola, 2011), education and health benefits are related to human potential at higher levels. The idea of human growth is unquestionably hampered by this, but it also serves as a starting point for determining the fundamental state of human capabilities and,

consequently, the degree to which governmental interventions are necessary. Over the past two decades, Nigeria saw more or less high rise in per capita income, which may have gotten under the country's skin due to its sluggish progress in human development. However, with increased market mechanisms put in place as a result of reforms, or with increased capitalization on health and education inputs, it is conceivable that different states or regions, whether rural or urban, will converge in terms of their success in terms of income and human development. The empirical literature on human development (Ogunleye et.al, 2017; Kanayo, 2013) acknowledges a number of capabilities that have a strong correlation with better growth, but losses occur on both sides of the equation. The major accord stated that, while increased growth generates resources for human development inputs, it does not always result in the improvement of human potentials (Ogunleye et.al, 2017; Kanayo, 2013).

In other words, rather than focusing on achievements at a later stage of growth, policy agendas must include goals for human development from the start. Because the form of growth with a particular level of wealth may lead to different human development results, this demonstrates that the results of human development are not solely emancipated from the growing process. Accordingly, the "method" matters more than just the consequences of growth. It is anticipated that growth processes that do not result in increased employment, particularly in rural areas, and incomes, as well as output compositions that do not redistribute and heavily rely on profit inflation, will be detrimental to human development. In this situation, disparities in wealth and geography are both evident.

The Solow and Swan neoclassical theory ensures constant return to scale. Further emphasis was placed on the fact that each transformation will take into account the level of information that has accrued. Lucas (1988) added that time spent in training or education determines the growth rate of human capital, demonstrating how human capital affects current production. Investing in health and nutrition is undoubtedly important, especially in developing nations where population productivity may be significantly hindered by deficits in these areas. Similar analytical approaches are used to examine the relationship between health and education. Human capital is a broad and complex phrase that encompasses many different kinds of investments in people. Investments are made in the same person for their education and health. The approach to generating, modifying, and disseminating knowledge and information is through education. According to Benhabib and Spiegel (1994), nations with highly educated inhabitants tend to close the technology gap more quickly than other nations. Investment in Health and Education is a key component of HCD and it affects Economic Growth. This was backed up by Barro and Sala-i-Martin (1995), who argued that growth is highly correlated with educational attainment (as measured by average years of schooling) and that public investment in the education sector also has a relevantly favourable impact on growth. Sen (1999) draw the conclusion that education can have a significant impact on both the income of the educated individual and the output sector of the economy. However, even with the same level of money, an individual may benefit most from education in terms of communicating, reading, engaging in argumentation, being able to make better educated decisions, and being taken more seriously by others. For instance, in adolescence, good health boosts academic performance; additionally, the likelihood of good adult health motivates adolescent schooling investments, while education has an impact on health in adulthood.

Additionally, all wellness initiatives depend on academic skills (including literacy and numeracy). Basic personal hygiene and sanitation are taught in schools. Education is necessary for the development and training of health staff. Additionally, longevity enhances the return on educational investments. However, in industrialized nations, the crucial component of human capital relates to the cognitive and non-cognitive skills acquired at home, at work, and in formal and informal training that are helpful in the production of services, goods, and new knowledge (Fuente, 2006). According to Adamu (2002), education is the most

effective weapon for transforming society, but the level and pace of transformation will depend on how much a nation invests in education relative to other sectors. Education supplies human resources with needed skills, knowledge and competences which make them functional and contribute to the all-around development of the country. Politically, investment in human capital ready's people towards participating in political processes, particularly as citizens in a democratic society in being able to vote in a more informed way. From the social, economic and cultural points of view, human capital investment helps to lead fuller and richer lives, less bound by tradition. It is a way to enable people; this in turn will assist them to contribute significantly to the growth process in the economy.

In conclusion, there is a two-way relationship between the development of human capital and economic progress, with human capital playing a role in the acceleration of growth. First, as a productive factor, human capital directly contributes to output. In this sense, increasing human capital would result in an increase in output. Level effect is the term for this. Second, as education promotes invention, diffusion, and adoption of new technologies, human capital helps to advance technical development. Consequently, human capital affects the growth of productivity. Rate effect is the second effect (Freire-Seren, 2001).

3.0 Methodology

3.1 Theoretical Framework

This study employs the augmented Solow human capital growth model, which was adopted from Oluwatobi and Ogunrinola, (2011) to properly comprehend the impact of human capital development on economic growth in Nigeria. The Solow growth model has been improved with the augmented Solow human capital growth model. Incorporating human capital was certainly a consideration in Solow's initial model. The Solow's model was augmented by Mankiw, Romer, and Weil (1992). The fact that labor in the production process is not homogeneous within a country or across different economies because of their possession of varying levels of skills and education forms the basis for the inclusion of human capital in the model.With this adjustment, using this concept in the Nigerian context is made easier and more suitable. The fundamental premise of this proposal is that increased education leads to higher productivity through a growth rate in worker quality. Therefore, the augmented Solow model is defined as:

$$Y = AK^{\alpha}(hL)^{\beta} \quad \text{.....} \quad (3.1)$$

where Y denotes either output volume or economic expansion; Let K stand for the amount of physical capital, h for the level of human capital, and L for labor, as determined by the number of employees. Let A represent the level of overall factor productivity, let be the elasticity of capital input to output, and let be the elasticity of labor input to output.

According to econometric theory, the model is as follows:

$$Y = AK^{\alpha}(hL)^{\beta}U \quad \text{.....} \quad (3.2)$$

We have, when transformed into a log-linear form,

$$\log Y = \alpha_0 + \alpha_0 \log K + \beta \log hL + W \quad \text{.....} \quad (3.3)$$

Where; α_0 = log$A$ and W = log U.

To achieve a solid outcome in the context of the Nigerian setting, the enhanced Solow human capital growth model would be modified to take an additional variable. These are government capital expenditures on education and health as well as government recurring expenditures. This additional element is necessary because improving the educational and health sectors is one of the main ways to develop human capital.

3.2 Model Specification

3.2.1 Definition of the human capital development and economic growth model

Using the aforementioned conceptualization;

Economic growth = *f* (Human Capital Development) ……..…. (3.4)

The Expanded model of Equation 3.4 is stated as follows:

$$\log Y_t = \alpha_0 + \alpha_1 \log K_t + \alpha_2 \log hL_t + \alpha_3 \log GREEH_t + \alpha_4 \log GCEEH_t + W \text{ ……..…. (3.5)}$$

Where;

Let Y be Real Gross Domestic Product (RGDP)

Let K be Gross Fixed Capital Formation

hL = Primary school enlistment, secondary school enlistment and tertiary school enlistment

GREEH = Government recurrent expenditure on education and health

GCEEH = Government capital expenditure on education and health

W = error term

log is Logarithm

α is constant

α_1 - α_4 are coefficients to be approximated

t = (1981-2021)

***A Priori* Expectation**

Based on the augmented Solow human-capital-growth model, stock of physical capital (K) is expected to have positive effect on economic growth that is, $\alpha_1 > 0$, total stock of human capital (hL) is expected to have positive effect on economic growth that is, $\alpha_2 > 0$, government recurrent expenditure on education and health is expected to have positive effect on economic growth that is, and government capital expenditure on education and health is expected to have positive effect on economic growth that is, $\alpha_4 > 0$.

3.3 Estimation Techniques

In this work, the estimating method employed by Bashier and Siam (2014) was adopted, and the level of stationarity of the chosen values was determined by running a unit root test. Ordinary least squares (OLS)

regression is used to comprehend the link between the variable, and the Johansen Cointegration method is used to determine the level of Cointegrating equations combining the endogenous and exogenous components (based on stationarity result).The assumption that the variables being evaluated are stationary is a fundamental notion underlying ordinary regression analysis. Additionally, many macroeconomic time series variables are frequently movable and change over time (Fleegler, 2006). Therefore, before performing regression analysis on time series variables, a test for immobility must be performed in order to prevent "bias estimations" or "spurious results."

3.4 Type and Source of Data

The study uses secondary statistics from the World Development Indicators (WDI) and Central Bank Statistical Bulletin 2018 issue, which spans the 36-year period from 1981 to 2021. Data on primary school admissions, secondary school admissions, and tertiary school admissions were sourced from World Development Indicators, whereas statistics on the total domestic product, total fixed capital formation, total government expenses on health, and total government expenses on education were sourced from the Central Bank Statistical Bulletin.

3.5 Definition of Variables

Gross Domestic Product: This is the total monetary worth of all commodities and services produced within a nation's borders over a predetermined time period.

Government Continuing Expenditures on Health and Social care:
This refers to the expenses incurred by the Nigerian government in support of education.

Government Capital Expenditure on Education and Health: This is a reference to the money the Nigerian government spends on healthcare.

Gross Fixed Capital Formation: This refers to the costs associated with purchasing fixed assets (such as buildings and machinery) in order to replace or increase the stock of existing fixed assets.

Primary School Enrolment: This is the entire enrolment in primary education, regardless of age, expressed as a proportion of the population of children who are legally able to attend primary school.

Secondary School Enrolment: This is the total enrolment in secondary education—regardless of age—expressed as a share of the population who are legally able to start first grade.

Tertiary School Enrollment: The total number of students enrolled in tertiary education, regardless of age, stated as a percentage of the group receiving formal primary education, is known as tertiary school enrolment.

Table 1. Measurements of Variables

Variable	Proxy	Measurement	Source of Data
Economic Growth	Real Gross Domestic Product	Annual Total Domestic Product (₦ billion)	Central Bank of Nigeria Statistical Bulletin Various Publications

Human Capital Development	Government Recurrent Expenses on Education and Health	Annual Government Recurrent Expenses Education and Health (₦ billion)	Central Bank of Nigeria Statistical Bulletin Various Publications
	Government Capital Expenses on Education and Health	Annual Total Government Capital Expenditure on Education and Health (₦ billion)	Central Bank of Nigeria Statistical Bulletin Various Publications
	Gross Fixed Capital Formation	Annual Total Fixed Capital Formation (₦ billion)	Central Bank of Nigeria Statistical Bulletin Various Publications
	Primary School Enrolment	Annual Primary School Enrolment (% gross)	World Development Indicators 2018 publication
	Secondary School Enrolment	Annual Secondary School Enlistment (% total)	World Development Indicators 2018 publication
	Tertiary School Enrolment	Annual Tertiary School Enlistment (% total)	World Development Indicators 2018 publication

4.0 Results

4.1 Descriptive Statistics

The outcome of the descriptive statistic of the variables under investigation is shown in table 2. Based on the results, the average Real Gross Domestic Product (RGDP) is ₦32,749.95 billion with standard deviation of 18,889.20. The result explained that on the average Nigeria earn Real Gross Domestic Product (RGDP) of about 1.43% and the standard deviation which is not far from the mean indicates that the human capital development as measured by its dimension.

The mean Gross Fixed Capital Formation (GFCF) is ₦2,293.108 billion with range of error 3,683.869. The mean Primary School Enrolment (PSE) is 93.164% with range of error 8.7845. The mean Second School Enrolment (SSE) is 31.256% with range of error 9.139. The mean Tertiary School Enrolment (TSE) is 6.931% with standard deviation of 2.926. The average recurrent expenditure on health and education is ₦160.040 billion with standard deviation of 215.654. The average capital expenditure on health and education is ₦48.793 billion with standard deviation of 55.900.

The measure of departure from symmetry is referred to as Skewness. All the factors involved in the analysis was effectively skewed or are rightward skewed except Tertiary School Enrolment (TSE). The measurement of the flatness of the data relative to the normal distribution is Kurtosis. Kurtosis values of the

variables indicated that all the variables are platykurtic or flat (<3) except Primary School Enrolment (PSE) which is leptokurtic (>3).

The Jarque Bera Statistics then checks to see if the variables are normal. We succeed in rejecting the null hypothesis for the other components at the 5 percent relevant level, but we are unable to do so for the variables GFCF and REEH.

Table 2. Descriptive Statistics of Variables

Variables	RGDP	GFCF	PSE	SSE	TSE	REEH	CEEH
Mean	32749.95	2293.108	93.16394	31.25590	6.931380	160.0400	48.79324
Median	22449.41	242.9000	92.03793	27.21662	6.121990	60.25000	23.37000
Maximum	69023.93	10571.74	113.0465	56.17987	10.48404	631.0000	154.7100
Minimum	13779.26	8.800000	78.61452	17.09992	2.325030	0.240000	0.240000
Std. Dev.	18889.20	3683.869	8.784911	9.138850	2.925873	215.6538	55.89967
Skewness	0.801592	1.436039	0.701924	0.908997	-0.069814	1.177478	0.827223
Kurtosis	2.141006	3.314047	2.821074	2.964834	1.361932	2.810104	2.193103
Jarque-Bera	5.099939	12.86899	3.087655	5.097275	4.166758	8.605394	5.223590
Probability	0.078084	0.001605	0.213562	0.078188	0.124509	0.013532	0.073403
Sum	1211748.	84845.01	3447.066	1156.468	256.4611	5921.480	1805.350
Sum Sq. Dev.	1.28E+10	4.89E+08	2778.288	3006.669	308.1864	1674236.	112491.8
Observations	37	37	37	37	37	37	37

Source: Researcher's Computation (2018)

4.2 Unit Root Test

The unit root test describes a time series process that is extremely relentless and in which the approved values are made up of the value from the previous period and any dependant disruption. Because non-stationarity series pose difficulties for regression research, evaluation of the attributes of time series has been given precedence over analysis of the association between relevant variables. Therefore, the stationarity test of the variable of interest in this study was conducted using the Augmented Dickey Fuller (ADF) test for unit roots in order to prevent false results.

According to Table 3, LOGRGDP is combined of order one since it is not stationary at the level and becomes immobile at the first difference. The fact that LOGGFCF is stationary at level indicates that the variable is zero-order integrated. Since LOGPSE is stationary at level, it follows that the variable is zero-order integrated. Although LOGSSE is not stationary at the level, it does become stationary at the first difference, suggesting that the variable is of order 1 integrated. The variable is combined of order one since LOGTSE is also mobile at level but becomes immobile at the first difference. Since LOGREEH is stationary at the initial difference, it is clear that the combination has an order of zero. Finally, the fact that LOGCEEH is mobile at level but static at the first difference suggests that the variable is integrated of order one.

In conclusion, since all attempts to model an ARDL Cointegration approach did not produce any useful results due to log of negative value among the data after the logarithm transformation, we used the Engle-Granger single equation Cointegration test to determine whether Cointegration exists between the variables.

Since time series variables are quite sensitive to lag length, we had to establish the ideal lag length before we computed the Cointegration test.

Table 3. Unit Root Test Using ADF

	Level		First Difference		
	ADF		ADF		
Variables	Constant	Constant and Trend	Constant	Constant and Trend	Conclusion
Log RGDP	0.032(0.955)	-2.421(0.363)	-3.340**(0.021)	-3.259*(0.090)	I(1)
Log GFCF	0.240(0.972)	-3.366*(0.072)			I(0)
Log PSE	-3.386**(0.018)	-3.370*(0.072)			I(0)
Log SSE	-1.979(0.295)	1.771(0.698)	-0.444***(0.001)	-4.398***(0.007)	I(1)
Log TSE	-1.843(0.355)	0.472(0.980)	-3.701***(0.008)	-4.184**(0.012)	I(1)
Log REEH	-1.900(0.328)	-3.354**(0.074)			I(0)
Log CEEH	-0.720(0.829)	-3.021(0.141)	-9.389***(0.000)	-9.264***(0.000)	I(1)

Note. ADF = Augmented Dickey Fuller
*Significant at 10% level; **Significant at 5% level; ***Significant at 1% level.

Table 4. Optimal Lag Length Selection Based on AIC for cointegration test

Lag	LogL	LR	FPE	AIC	SIC
0	14.660	NA	1.50e-09	-0.451	-0.343
1	240.306	345.105	4.92e-14	-10.842	-8.328
2	287.315	52.540	8.18e-14	-10.724	-9.117
1	420.688*	94.146*	2.03e-15*	-15.688*	-13.330*

Note: LR is for sequential modified likelihood ratio test statistic; FPE stands for final prediction error; AIC stands for Akaike information criterion; SIC stands for Schwarz information criterion; NA stands for not applicable.

Table 4 shows the result of the optimum lag length selection analysis. The lowest value of AIC is -15.688. Therefore, lag 3 is considered to be the optimal lag length.

4.3. Single Equation Co-Integration Test

We estimated the Engle-Granger residual-based test for co-integration after determining the ideal lag length. This test is a straightforward unit root test applied to the surplus obtained from the single equation ordinary least squares regression estimate under the presumption that there is no existence of co-integration

As shown by the inconsequential probability values of the tau-statistics (0.893) and z-statistics (0.877), which are not significant at the 5% significant level, the result (Table 5) indicates that there is no co-integrating equation. The null hypothesis that there is no co-integration is therefore accepted. In order to estimate the ordinary least squares regression (OLS), the variables are differenced.

Table 5. Single Equation Cointegration Test Outcome

Dependent	tau-statistic	Probability	z-statistic	Probability	Decision
LOG RGDP	-2.861	0.893	-14.379	0.877	No cointegration

4.4. Ordinary Least Squares Regression

The OLS regression's findings (Table 6) show that the constant has a value of 0.008, meaning that if the explanatory variables for the Δ(LOGRGDP) function are set to zero, the short-run value of the cumulative percentage of Δ(LOGRGDP) over the course of 37 years will be around N0.008 billion.

The change in the present period itself is also positively and significantly impacted by a one period lag of Δ(LOGRGDP), with a coeval of 0.438 and probability value of 0.015. The outcome indicates that in the short term, a N1 billion rise in the present real gross domestic product will result in a N0.438 billion growth on itself in Nigeria during the next year. Δ(LOGGFCF) is positively correlated with Δ although not significantly (LOGRGDP).

The coefficient is 0.044, meaning that a N1 billion increase in Δ(LOGGCE) will, in the near run, result in a N0.044 billion increase in Δ(LOGRGDP) in Nigeria. D(LOGPSE) has a negative and negligible relationship to Δ. (LOGRGDP). Because of the coefficient, which is 0.074, a short-term increase in Δ(LOGPSE) in Nigeria will result in a reduction in D(LOGRGDP) of 7%. D(LOGSSE) is positively and weakly connected to D. (LOGRGDP). Since the coefficient of is 0.082, a short-term increase in D(LOGRGDP) in Nigeria of 1 percent will result in a short-term increase in D(LOGSSE) of about 8 percent. Δ(LOGTSE) is positively and weakly connected to D. (LOGRGDP).

According to the coefficient of 0.127, a short-term growth rate of 1 percent in D(LOGTSE) in Nigeria will result in a growth rate of almost 13 percent in D(LOGRGDP). Positive and tangentially linked Δ(LOGREEH) (LOGRGDP). The coefficient of is 0.004, which means that a short-term increase in Δ(LOGREEH) in Nigeria of N1 billion will result in a short-term increase in Δ(LOGRGDP) of roughly N0.004 billion. Lastly, Δ(LOGCEEH) is positively and weakly connected to D. (LOGRGDP). The coefficient of is 0.009, which means that for a limited period, a N1 billion increase in Δ(LOGCEEH) will result in a N0.009 billion increase in Δ(LOGRGDP) in Nigeria.

The R2 value of 0.398 indicates that the independent variables are responsible for almost 40% of the variations in Δ(LOGRGDP).The overall importance of the explanatory variables in a given model is assessed using the F-statistic. According to the regression's findings, the F-statistic had a value of 2.554 and a probability of 0.037, both of which were significant at a 5 percent negative level. When the F-statistic has

a level of relevance of less than 5%, the null hypothesis is rejected according to the F-statistic decision rule. We reject the null hypothesis and come to the conclusion that the explanatory factors are important in explaining changes in the dependent variable since the F-statistic is below the required 5 percent critical level.

The link between values separated from one another by a specific time lag is known as autocorrelation, and it can be detected using the Durbin-Watson statistics .It looks for serial correlation in the residuals of a statistical regression study. A number of two (2) on the Durbin Watson scale, which ranges from 0 to 4, indicates that the model has no serial correlation. A value close to zero (0) denotes positive autocorrelation, whereas a value close to four (4) denotes negative autocorrelation. It is preferred for the Durbin Watson value to be two (2), or even closer to two (2).

Given that the Durbin Watson value in the regression is more than 2, it may be concluded that there is no serial correlation in the model. In this case, the value is 2.161.Because all of the independent factor p-values are not significant at the 5 percent critical level, the null hypothesis number one, which claimed that the development of human capital has no appreciable impact on economic growth in Nigeria, was accepted. The results also appear to confirm the augmented Solow human capital growth model, with the exception of elementary school enrollment, which had a negative impact on economic growth. This suggests that the government shouldn't prioritize funding for enrollment in primary schools. The government's incapacity to combat unemployment, keep up with technological improvement, equip our hospitals with the most up-to-date medical equipment, provide free education for the thronging population, etc., means that the irrelevant effect of human capital development is not far off. This finding continues the analysis of the relationship between human capital and economic growth in Nigeria by Kairo, Mang, Okeke, and Aondo (2017), Adeyemi and Ogunsola (2016), and Obi, Yelwa, Anyanwu, and Adam (2015). The results showed that the majority of human capital development criteria had a short-term, favorable, and minimal impact on Nigeria's economic growth.

Table 6. OLS Regression Result

Dependent variable, LOGRGDP	Coefficients	T-ratio (p value)
(Constant)	0.008	0.678(0.504)
D(LOGRGDP(-1))	0.438	2.609***(0.015)
DLOGGFCF	0.044	1.448(0.159)
DLOGPSE	-0.074	-0.560(0.580)
DLOGSSE	0.082	0.976(0.338)
DLOGTSE	0.126	0.813(0.423)
DLOGREEH	0.004	0.623(0.623)
DLOGCEEH	0.009	0.803(0.429)
R^2	0.40	

Adjusted R2		
Durbin-Watson statistic	2.161	
F statistic	2.554**	(0.037)

**Relevant at 5% level; ***Relevant 1% level.

4.5. Diagnostic Test

Table 7 displays the diagnostic test's findings. When the variance of the model's residuals is inconsistent, the condition is known as heteroscedasticity. The Breusch-Pegan-Godfrey test (BPG Test) is used to determine whether heteroscedasticity is present. Since there is no heteroscedasticity, which is one of the assumptions of OLS regressions, the null hypothesis is accepted because the value of p is greater than the 5 percent critical level.

The expression "test for normality" is sometimes used to denote a situation in which model residuals exhibit normal behaviour.While the Jarque-Berra test is used in this study to check for normalcy. The alternative hypothesis is accepted because the value of p is greater than the threshold level of 5%, which suggests that the residuals are distributed normally. This is desirable because it also satisfies the assumption of OLS regression.

Table 7. The Diagnostic Tests for Regression Estimate

Test for Normality (Jarque-Bera)	**Heteroscedasticity Test**
1.579(0.454)	1.309(0.284)

Note: Probability values in brackets.

5.1 Summary, Conclusion and Recommendation

Using time series data from 1981 to 2021, this research investigates the relationship between economic growth and the development of human capital in Nigeria. While real gross domestic product is used to measure economic growth, the growth of human capital is measured by factors such as gross fixed capital formation, primary enrollment, secondary enrollment, tertiary enrollment, government recurrent expenditures on education and health, and administrative capital expenditures on education and health.The study uses the Engle-Granger single equation cointegration test, OLS regression analysis, and the test (unit root) to demonstrate that changes in human capital statistically affect an expansion of the economy. The results of the unit root test show that there is still a mixture of I(0) and I(1) variables, the cointegration test shows that there is no cointegration between the variables, and the OLS regression shows that all other variables, with the exception of PSE, have a temporary and productive impact on the growth of human capital in Nigeria. Overall, it can be said that Nigeria's economic growth is not much impacted by the development of human capital.

5.2 Recommendations

In view of the research carried out, the analysis recommends that:

(i) Since it is well established that elementary school education does not significantly affect economic growth, the government shouldn't spend additional funds for it.

(ii) More funding should be allocated by the government to secondary schools and higher institutions so that kids can receive a high level of education and be competitive in the developed economy.
(iii) Authorities should pledge more fund to the health division which can be able to provide efficient health care to the citizenry as a means of increasing human capital development.
(iv) Authorities should ensure that the necessary education and training policy aimed at promoting continuous physical capital to a higher level is available.

References

Adamu P. A. (2002). The impact of human capital on economic growth in Nigeria: An error correction approach. Paper presented at the 2002 Annual Conference of the Nigeria Economic Society, Nigeria.

Adelakun, O. J. (2011). Human capital development and economic growth in Nigeria. *European Journal of Business and Management, 3*(9), 29-38.

Adeyemi, P. A. and Ogunsola, A. J. (2016).The impact of human capital development on economic growth in Nigeria: ARDL approach. *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 21*(3), 1-7.

Aghion, P. and Howitt, P. (1998).Endogenous growth theory. Cambridge, MA: The MIT Press.

Anyanwu, S. O., Adam, J. A., Obi, B. and Yelwa, M. (2015). Human capital development and economic growth in Nigeria. *Journal of Economics and Sustainable Development, 6*(14), 1-12.

Barro, R. (2001). Human capital and growth. *American Economic Review*, 91, 12-17.

Barro, R. and Salai-Martin, X. (1995).*Economic Growth.* New York: McGraw Hill.

Bashier, A. and Siam, A. J. (2014). Immigration and economic growth in Jordan: FMOLS approach. *International Journal of Humanities Social Sciences and Education (IJHSSE), 1*(9), 85-92.

Benhabib, J. and Spiegel, M. M. (1994).The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary Economics*, *Elsevier, 34*(2), 143-173.

Ejere, S. I. (2011). Human capital formation as catalyst for national development: Nigeria in perspective. *International Business and Management, 2*(2), 98-104.

Fleegler, E. (2006). The twin deficits revisited: A cross-country empirical approach being honours thesis submitted in partial fulfilment of the requirements for graduation with distinction in economics in Trinity College of Duke University. Springer Verlag.

Freire-Seren, M. J. (2001). Human capital accumulation and economic growth. *Economic Investigations*, 3, 585-602.

Fuente, A. D. (2006). Education and economic growth: A quick review of the evidence and some policy guidelines. A Paper presented Globalization and Challenges for Europe and Fairland organized by the secretariat of the Economic Council.

Idenyi, O. S., Eze, O. R. and Ogbonna, O. S. (2016).Analysis of the relationship between human capital development and economic growth in Nigeria. *European Journal of Accounting, Auditing and Finance Research*, *4*(3), 56-71.

Kairo, C., Mang, N. J., Okeke, A. and Aondo, D. C. (2017). Government expenditure and human capital development in Nigeria: An Auto-Regressive Distributed Lagged Model Approach (ARDL). *International Journal of Advanced Studies Economics and Public Sector Management, 5*(1), 143-158.

Kanayo, O. (2013). The impact of human capital formation on economic growth in Nigeria. *Journal of Economics*, *4*(2), 121-132.

Lucas, R. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*, 22, 3-42.

Lucas, R. E. (1998). On the mechanics of economic development. *Journal of Development Economics*, 22, 3-42.

Mankiw, N. G., Romer, D. and Weil, D. N. (1992).A contribution to the empirics of economic Growth. *Quarterly Journal of Economics*, 107, 407 437.

Marshall, A. (1890). *Principles of economics* (8th ed.). London: Macmillan.

Mincer, J. (1958).Investment in human capital and personal income distribution. *Journal of Political Economy*, *66*(4), 281-302.

Nigerian Vision 20:2020 Document (2010). Nigeria Vision 20:2020: The First National Implementation Plan (2010–2013), Vol. 2: Sectoral Plans and Programmes.

Ogunleye, O. O., Owolabi, O. A., Sanyaolu, O. A. and Lawal, O. O. (2017).Human capital development and economic growth in Nigeria. *IJRDO-Journal of Business Management*, *3*(8), 17-37.

Okojie, C. E. E. (1995). Human capital formation for productivity growth in Nigeria. *Nigerian Economic and Financial Review*, June, 44-55.

Oluwatobi, S. O., & Ogunrinola, O. I. (2011). Government expenditure on human capital development: Implications for economic growth in Nigeria. *Journal of Sustainable Development*, *4*(3), 72-80.

Romer, P. M. (1986).Increasing returns and long-run growth. *Journal of Political Economy*, 94 1002-1037.

Romer, P. M. (1990). Human capital and growth: theory and evidence. NBER Working Paper 3173.

Saad, W. and Kalakech, K. (2009).The nature of government expenditure and its impact on sustainable economic growth. *Middle Eastern Finance & Economics*, (4), 39-47.

Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51, 1-17.

Sen, A. (1999). *Development as freedom* .New York: Anchor Books Press.

Smith, A. (1776). *The wealth of nations. Modern.* (Cannan) Library Edition with the foreword by Max Lerner, New York.

Temple, J. (1999). The new growth evidence. *Journal of Economic Literature*, 37, 112-156.

Todaro, M. P. and Smith, S. C. (2011).*Economic development* (11th ed.), Addison- Wesley. Pearson.

United Nations Development Program (2009).Overcoming Barriers: Human Mobility and Development. Published for the United Nations Development Programme (UNDP).