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Human Development and Economic Growth in Nigeria: An Empirical Study

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Abstract
This study empirically examines the impact of human development on economic growth in Nigeria. Specifically, the study looks into how human development affect real gross domestic product (RGDP) in Nigeria using time series data for the period 2003 to 2015. Error correction model (ECM) and Pairwise Granger Causality test are used in analyzing the data. The study carries out test of stationarity of the variables using Augmented Dickey–Fuller unit root test and test of long-run relationship among the variables using Johansen Cointegration test. The findings show that human development has significant causal relationship with economic growth in Nigeria. Unidirectional causality runs from human development to real GDP in Nigeria. All variables of the study are cointegrated and have a long-run relationship that indicates a divergence from equilibrium with a speed of 84%, hence, the explanatory variables have to be adjusted by 84% of the past year deviation from equilibrium. The study recommends among others that adequate attention be given to indices of human development index that is education, life expectancy, health and income in purchasing power parity amongst others as enlisted by the UNDP as improving on them will go a long way in improving the human production capacity of the people that would and hence translate to improvement in economic growth in Nigeria.

Keywords: Human Capital Development, Gross Capital Formation
JEL classification: O15

1. Introduction

Human development plays a fundamental role and remains the most important factor in economic growth and development in countries of the world. The Human Development Index (HDI) is a composite statistic used to rank countries by level of "human development" and to separate countries into developed (high development), developing (middle development), and underdeveloped (low development) categories. The statistic is computed using data on life expectancy, education and per capita GDP,

each as an indicator of standard of living. Human Development (HD), being the ultimate objective of each and every human activity, it plays a vital role in producing high skilled manpower that leads to economic growth and hence economic development. "Human development denotes both the processes of widening people's choices and level of their achieved wellbeing" (UNDP, 1990). Human development is the enlargement of people's choices to live more prosperous lives.

Economists consider human development as one of the most important ingredients of economic growth (Afzal, Butt & Rehman, 2010). Sustained economic growth accompanied with social development is one of the notable macroeconomic objectives of every country and in this regard human development is deemed as an essential ingredient (God'[s] time, & Uchechi, 2014).

The government of Nigeria has failed to reap the maximum benefits from human capital development due to less emphasis and less budget allocation to social sector. Despite almost threefold increase in total expenditure of public sector since 1999 post military era, the government spending on health and education has remained low. In fact, spending on health as a percentage of GDP has even declined over time as it was 0.98% of GDP in 1999 which declined to 0.92% of GDP in year 2014.The estimates of government education expenditure in Nigeria as a share of GDP and of total government expenditure can be compared to the situation in other sub-Saharan African countries. UNESCO's World Education Report (2000) presents the data for 19 countries across sub-Saharan Africa for 1996. The average share of GDP was 4.7%and of government expenditure was 19.6%. In both cases, the measures of educational expenditures for Nigeria (2.3% and 14.3% respectively) are relatively low.

However, recent data shows that total expenditures on education by all governments combined were equal to 3.5% of GDP and 15.2% of total government expenditure. Education expenditures were equal to 15% of total federal expenditures and 21%, 27% and 29% of the total expenditures of the Northern, Eastern and Western regional governments respectively. In terms of education spending, Nigeria is one of the lowest in Africa and in terms of human development index by UNDP latest ranking of August 30, 2016 report, Nigeria ranked at 152nd position. Consequently, the country retained its 2014 status as there was no forward or backward shift from the computation. Nigeria's HDI value for 2014, according to UNDP's 2015 report, was 0.514 which put the country in the low human development category, positioning it at 152 of 188 countries, whereas Mauritius ranked at 63rd position, Tunisia ranked at96th position; Botswana ranked at106th position; Sao Tome and Principe ranked 143rd position; Kenya was placed at 145th position on the list of countries ranked low. The country of the region, that has the lowest was Niger, is considered to be low human developed nation and ranked at 188th.

Most of the empirical researches conducted on the subject matter on Nigerian economy has defined human development in terms of education indicators or in terms

of health indicators. These (indicators) alone according to Asghar, Awan and Rehman, (2012), fail to capture development and skills of the labor force; therefore, there is a need to conduct research on this aspect that uses much broader measure of human development in the context of Nigerian economy. Besides conflicting results from the previous studies, none of the studies estimate the magnitude of influence exerted by the identified variables. The present study is an attempt to use broader measure of human development as it uses human development index as proxy for human development and real gross domestic product as proxy for economic growth (Ogujiuba, 2013).

Some studies argue that human development have had impact on economic growth. For instance Judson (2002), Ranis, Stewart and Ramitez, (2000) among many others uphold that human development has a positive long run relationship on economic growth, whereas, Liu, Squire and Zou (1998) among others see otherwise relationship between human development and economic growth. Also, researches till today hold different opinions regarding the causal nexus between human development and economic growth. However, most of these studies present inconclusive and contradictory results over the relationship between human development and economic growth and as such more studies are needed in this area for Nigeria and this justify the need for this research.

It is in the light of these conflicting views on the dynamic impact and causality relationships, the possible long run relationship that may exist between human development and economic growth, and the recent improvement in availability of data on human development index call for this study. Therefore, the objectives of this study is to empirically estimate the dynamic relationships between human development and economic growth in Nigeria, to investigate the direction of causality between human development and economic growth in Nigeria and also to ascertain whether long run relationship exists between human development and economic growth in Nigeria.

This paper is divided into five sections, with section two clarifying relevant concepts and review of literatures. Section three discusses sources of data used for analysis, states the hypothesis, specifies the relevant model and outlines estimation and evaluation techniques. Section four analyzed data, while section five dwells on recommendations and conclusion.

2. Literature Review

2.1.1 Concept of Human Development

Human development is a development paradigm that is of more significance than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potentials and lead productive and creative lives in accord with their needs and interests. People are the real wealth of nations. Development is, thus, about expanding the choices of people's lives. Therefore, much more than economic

growth which is only means of enlarging people's choices (MahbubulHaq, 1998). Human development is related to economics and standards of living (World Bank, 2005). Human capital refers to the stock of competences, knowledge and personality attributes embodied in the ability to perform labour so as to produce economic value. It is the attributes gained by a worker through education and experience. Many early economic theories refer to it simply as workforce, one of three factors of production, and consider it to be a fungible resource – homogeneous and easily interchangeable. Other conceptions of labour dispense with these assumptions. Human capital theory predicts that more educated individuals are more productive (UNDP, 2005).

According to the theory of Mincer (1958), productivity of labour is high with educated individuals and consequently they contribute far more to the level of national income and also earn higher income than their uneducated counterparts. Furthermore, education is a good measure of human development and the relationship between human development and poverty level has a significant effect on economic growth and development in some selected countries of the world.

2.1.2 Human Development Index

Human Development (HD) and Human Development Index (HDI) are powerful concepts. The former refers to the process of empowerment in the possession of the capacity to build up oneself so as to be able to live a long life, be able to read and write and to participate in the societal affairs effectively and above all be gainfully employed to earn a living. The latter merely establishes how far a country has been able to achieve this for its citizens in numerical qualitative evidence represented by a real number. The fact is that earlier indices of development such as per capita income and its various derivatives have not been able to establish this effectively, especially for comparative purposes. HDI is an index fashioned out of education, life expectancy and income in purchasing power parity (UNDP, 2010-2015).

2.1.3 Human Development Report

The first Human Development Report in 1990 opened with the simply stated premise that has guided all subsequent Reports: "People are the real wealth of a nation." By backing up this assertion with an abundance of empirical data and a new way of thinking about and measuring development, the Human Development Report has had a profound impact on development policies around the world. The 2010 Report continues the tradition of pushing the frontiers of development thinking. For the first time since 1990, the Report looks back rigorously at the past several decades and identifies often surprising trends and patterns with important lessons for the future. These varied pathways to human development show that there is no single formula for sustainable progress. In other words, no single index could ever completely capture such a complex concept—and that impressive long-term gains can and have been achieved even without consistent economic growth. Looking beyond 2010, this Report surveys critical aspects of human development, from political freedom and

empowerment to sustainability and human security, and outlines a broader agenda for research and policies to respond to these challenges (UNDP, 2005).

The HDI is a composite measure of human development covering health and education as well as income. It was devised by the late Pakistani economist Mahbubul Haq for the first Human Development Report in 1990. The new 20th Anniversary Edition of the Report revisits that original analytical exercise, using new methodologies and international data sources, also looking back to 1970. The HDI 2010 report combines three dimensions: Longevity (a long and healthy life): measured by Life expectancy at birth; Knowledge (access to knowledge): measured by Mean years of schooling and Expected years of schooling; and Standard of living (decent standard of living): measured by purchasing power based on GNI per capita (PPP US$).

2.2 Theoretical Framework

The initial theory of human development dates back to pioneer work of Mincer (1958), Schultz (1961) and Becker (1962), who believe that human development is just like physical capital and one can invest in it by means of education, health and training which, in turn, will raise output and contribute to economic growth. Furthermore, proponents of endogenous growth theory lay emphasis on human capital formation and regard it a factor which explains difference in growth performance of under developed and developed nations (See, Asghar, Awan and Rehman, 2012; Romer, 1990; Lucas, 1988; Rebelo, 1991). Therefore, it can be concluded that human development has gained significant importance in growth theories (Russo, Santos, & Parré, 2012).

Solow (1957) introduced the influence of technological progress on the production process. The model introduces total factor productivity growth, represented by parameter A, which is sometimes also referred to as the available technology stock. The basic Solow model's production function exhibits constant returns to scale and is assumed to be capital-augmenting or Solow-neutral technology, as seen in the following Cobb-Douglas production function:

$Y = f\,(K, AL) = AK^{\alpha}L^{(1-\alpha)}$………………………………………………………..1

Where: Y = level of output in a given period; A = an index for the level of total factor productivity; K = the available level of physical capital; L = the available labor supply and finally; α= is a parameter that represents the capital elasticity of output.

Because this study is primarily concerned with savings productivity growth per worker, it is required to restate the above production function in per worker terms:

$y = AK^{\alpha}$ ………………………………………………………………..……..2

The neo-classical theory of growth developed by Solow (1957) centered macroeconomists' attention throughout the 1960's and 1970's on tangible (physical) capital formation as the driver of economic growth. However, the theory showed that,

the accumulation of capital would not indefinitely support a steady rate of growth in labour productivity due to the decreasing marginal returns in substituting physical capital for labour.

The recent literature on "endogenous economic growth" emerged primarily as an attempt to encompass the sources of technological progress and hence of sustained productivity growth within the general equilibrium framework of neoclassical growth theory. In the literature, several distinct explanations of the process of economic growth are provided, each of which carries particular empirical and policy implications. Romer's "AK model" generates sustained growth by assuming that technological change is the unintended result of specializing in investments by firms. Creating the capacity to produce additional specialized intermediate products is assumed to work like Adam Smith's principle of division of labour, but at the aggregate level. Also, the resulting externalities yield increasing returns to cumulative investment, and thus the production of goods can avoid the decreasing returns to rising capital-intensity that the neoclassical model posited. In addition, these externalities imply that the competitive equilibrium growth path does not coincide with that which could be achieved in an optimally planned economy

The contributions by Uzawa (1965) and by Lucas (1988) reveal how individual decides on how much of his available time is spent for producing physical output and how much is used for the formation of human capital. Uzawa and Lucas deduce that human development is the result of human capital input alone. However, neither of these models allows for public spending in the process of human capital formation. Contributions, which acknowledge that the public sector can stimulate the formation of human capital by devoting public resources to schooling, include Glomm and Ravilumar (1992), Ni and Wang (1994), Beauchemin (2001) and Blankenau and Simpson (2004).

The latter conclusion was reached by virtually all the theoretical analyses based upon successive formulations that belong to the family of "endogenous growth models". This implies that policy action might improve growth performance. Subsequently, through the explicit introduction of human capital and/or knowledge, endogenous growth models have fleshed out the process of technological change. Lucas (1988) asserts that human capital is not fundamentally different from physical capital. It is considered as another input in the production function, formed by workers through certain activities (principally education or on-the-job training). By assuming that human capital formation has constant returns – based on the argument that workers' knowledge "spills over" – the model can achieve a positive steady-state rate of growth in labour productivity. A second line of analysis focuses on modeling other important activities pursued by skilled labour, especially innovation while shifting attention away from treating human capital as a direct input to the production of goods. The main form of technological change recognized by the endogenous literature following

Romer (1990) is that which results from research and development (R&D) investment that creates a greater variety of goods, or improves the quality of existing investments.

This analysis brought out the significant point that when human capital is modeled as a factor affecting innovation, the long run rate of productivity growth is positively affected by the human capital stock's level; whereas, in the Lucas (1988) model, the rate at which human capital is being accumulated, relative to the existing stock, was seen as the critical determinant of productivity growth. However, the early growth models (Harrod 1939; Domar 1946; Solow 1996) explained the long-run growth path of advanced capitalist economies in terms of technological progress and accumulation of capital. These models were solely concerned with growth in income. From the perspective of a developing country, the model has limited relevance to the extent that increased accumulation of capital is the basic condition for the growth of economies.

Development theories from earlier times accepted the importance of structural transformation in the process of economic development (Lewis 1956; Fei and Ranis 1996). Through stylized facts of development, these models also explained the importance of attaining structural transformation in developing economies. In addition development economics gained an added thrust with the publication of Sen (, 1984, and 1985). Sen (1984) divided the whole concept of development in terms of commodities and capabilities by emphasizing the importance of capabilities over commodity approach. He also acknowledged that GNP is a measure of the amount of the means of well-being of people, but it does not reveal what the people are doing to progress from achieving their means, to their ends. It can be deduced from the writings of Sen (1985), that achieving development cannot be a matter of quantifying income alone, but has to be incorporated with the actual achievement themselves.

Developments in the growth theory have started acknowledging the importance of development variables. For example (Romer, 1982) tries to incorporate some of the development variables like human capital, into the growth framework. Recently empirical cross country studies (Young, 1995) also acknowledge the importance of increased participation in the labour force, educational improvement and intersectoral transfer of labour from agriculture, as earlier parts of development thinking. Thus, the tendency of convergence between growth economics and development economics has increased. Attempts have also been made to relate these two concepts of economic growth and human capital development empirically (Ranis and Stewart, 2001). The focus of this study is on the two-way relationship between economic growth (EG) and human development (HD). The study views human development as a central objective of human activity and economic growth as a very important instrument that has the potential for advancing it.

While there is persuasive evidence about the positive relation between initial human capital levels and output growth and (weaker) empirical support for the relationship between changes in human capital and growth, it is unclear whether there is a causal relationship between human capital and growth. Bils and Klenow (2000) suggest that

the causal direction may run from growth to schooling. Inspired by the fact that there has been a dramatic increase in schooling in the last 30 years at the same time that the "productivity slowdown" became manifest in many of the higher income economies, a Mincerian model would predict that relationship by asserting that growth leads to lower discount rates in the country thus increasing the demand for schooling. Both variables may of course be driven by other factors. Based on results from various empirical tests, it was deduced by Bils and Klenow that the link from schooling to growth is too weak to explain the strong positive association found by Barro (1991), and Barro and Lee (1993), as described above. But, they argue, the "growth to schooling" connection is capable of generating a coefficient of the magnitude reported by Barro. Lucas (1988) retains other elements of the neoclassical growth model but includes human capital as an additional input in the production of goods. This model assumes that the output of the economy can be generated by using the labour force to accumulate human capital and combining it with physical capital. One version of the model assumes that human capital is acquired through time spent in an educational process that is (non-productive). This means that a trade-off is introduced for workers between employing time to produce output and using it to gain further human capital that will increase their marginal productivity when working in subsequent periods.

It is also evident in another version of the model that on-the-job training can enable workers gain human capital and so their productivity is increased later on by the time employed working. In the case of education, human capital accumulation involves a sacrifice of current utility in the form of less current consumption, or in the case of on-the-job training, a less desirable mix of current consumption goods is considered. Albeit, the literature on endogenous growth theory has stimulated economists' interest in empirical evidence bearing on cross-country comparisons of the existing relationships between human capital formation and the growth rate of real output. Some growth models view human capital as a simple input to production. They predict that growth rates will be positively associated with changes in the stock of education. However, models in which human capital plays a role in the development of innovations and its diffusion throughout the economy assume that it is the stock (rather than the flow) of human capital that affects the overall productivity growth rate of the country. One force of sustained per capita growth in endogenous growth models is human capital. The literature on human capital formation is abounding with partial equilibrium analyses of production and cost functions of education (Prakash and Chowdhury, 1994).

In order to determine the dynamic evolution of output, the Solow-Swan and Ramsey models suggest that it is sufficient to use the equation describing physical capital accumulation. When human capital is included, it is necessary to consider an additional sector where the growth of human capital takes place in order to specify the growth path. Since physical capital has diminishing returns, the requisite assumption for the model to exhibit a positive growth rate of output per worker in the steady state is that the "technology" for generating human capital has constant returns. This means

that whatever the level of human capital attained, the growth of human capital is assumed to be the same for a given level of effort. Based on this assumption, output growth rate (per worker) is positive and increasing in the productivity of education or on-the job training in the creation of human capital. Azariadis and Drazen (1990) model the mechanism of human capital transmission across generations in the more plausible framework of an overlapping generation's model (Lucas followed Ramsey in the simplifying assumption that firms and households are infinitely lived). These models stipulate that the human capital accumulated by the previous generation is inherited by agents. They then decide how much time to devote to training young graduates in acquiring further skill in technology that increases the quality of their labour, and in so doing affect their marginal productivity when they are older. In deciding its own human capital investment, a given generation does not take into account the inter-temporal spill-over effect upon the human capital endowment of future generations. As such, a technological externality occurs which can result in constant or increasing returns to human capital at the social level. This outcome could be attributed to the impossibility of contracting with the future generations and is sometimes referred to as allocation inefficiency due to "incompleteness of markets". This problem affecting human capital investment comes from a source which is rather different from the set of conditions previously seen to impair the allocative efficiency of markets that do exist.

Therefore, Lucas endogenous theory of growth will serve as the foundation of this work. Lucas (1988) presented a growth model in which output is generated via a production function of the form

$$Y = AK^{\alpha} (uhL)^{(1-\alpha)} h_a \qquad \ldots 3$$

Where: Y is the level of output produced; A is the technical coefficient and K is the input of physical capital. The variable u is the proportion of total labour time spent working, and h is what Lucas calls the stock of 'human capital. h_a is the average human capital level and α is a parameter that represents the capital elasticity of output

2.3 Review of Empirical Studies

Early studies of the effects of human capital on growth, such as Mankiw (1992) and Barro (1991), were based on data sets from the post-1960s era pertaining to a very diverse array of (more than 100) countries. Narrow flow measures of human capital were used such as the primary and secondary school enrolment rates and it was found that these and output growth rates were positively associated. A report by Barro (1991) stated that the catching up process was firmly linked to human capital formation: only those poor countries with high levels of human capital formation relative to their GDP tended to catch up with the richer countries. Barro and Sala-iMartin (1995), among many others, have also included life expectancy and infant mortality in the growth regressions as proxies for tangible human capital in order to complement the intangible human capital measures derived from school inputs or

cognitive tests considered; in their findings, it is evident that there is a strong positive relationship between life expectancy and growth.

More robust results were reported in a survey by Krueger and Lindahl (1998) from the econometric studies of cross-country growth equations. First, growth rates do not seem to be affected by changes in the human capital stock as suggested by the model in Lucas (1998). This contrasts with the robust evidence from the micro literature on the effect that education has on income. Having made allowances for measurement errors, it is found that there is a positive correlation between the change in stock measures of education and economic growth. Secondly, although the evidence regarding the positive effect of the level of human capital stock on growth rates is much stronger, the size of this effect varies across countries. Two other well-established results that emerged from the cross-country studies examined by Krueger and Lindahl are:

The greater effect of secondary and higher education on growth, compared with primary education, and the negative or insignificant effect that female education seems to have on the growth of output. Regarding the latter, they concur with Barro (1999) in suggesting that the insignificant effect of female education may be a result of gender discrimination in the labour markets of some countries. The contention is that although females in these countries receive education, they are unable to contribute to the growth of output because they are discouraged from participating in the labour market. Apart from this problem, it appears that there are other mechanisms also at work. In countries with high female participation in the labour market, variations that exist in the level of female education have an insignificantly small positive effect on output growth rates.

In the 1990's and early 2000's pioneering econometric studies (based on international panel data for a widely diverse array of countries during the post-1960 era) provided empirical support for the conclusion that human capital formation was among the factors that significantly affected the aggregate level rate of economic growth. It was found that successfully catching up internationally in terms of GDP growth was positively related to the overall social rate of human capital formation. Moreover, the countries which were poor and had the tendency of catching up with the higher income economies were restricted to those that were maintaining levels of investment in formal education which were high in relation to their respective GDP levels. Three robust empirical findings have been revealed in more recent econometric studies. The hypothesis that changes in the human capital stock affect growth rates has weak empirical support, The hypothesis that the relative level of the stock of human capital (in relation to the labour force or aggregate output) has a positive effect on growth rates has a strong statistical support and The magnitude of the "level effect" of the human capital stock is itself far from uniform across the distribution of economies; the impact on growth rates does not vary linearly with the relative size of the stock but,

instead, becomes proportionately smaller among the economies where the average educational attainment is already high.

The broad interpretation of these findings in the context of recent growth models is that raising the general level of educational attainment interacts positively with other forces - among them is the accumulation of complementary physical capital and the application of new technologies. This higher intensity of human capital permits countries to accelerate their productivity growth rate and narrow the relative size of the per capita real income gaps separating them from the leading economies. Maintaining a high average level of educational attainment, and correspondingly high rates of investment in other forms of human capital (for example, health, internal spatial and occupational mobility), would appear to serve as a stabilizing force – although not a guarantee – against continuing secular decline in a country's relative per capita income position. Nonetheless, most of the theoretical literature on economic growth focuses on the role that investment in formal education plays in modern economies.

Regarding the empirical relevance of human capital, there is evidence that education is positively correlated with income growth. At the microeconomic level, the positive correlation seems to be quite robust. On the macroeconomic level, the findings are more fragile (Krueger and Lindahl, 2001) which, however, may be due to measurement errors. Krueger and Lindahl (2001) demonstrate that cross-country regressions indicate that the change in education is positively correlated with economic growth if measurement errors are accounted for. Further, Levine and Renelt (1992) have shown that human capital, measured by the secondary enrolment rate, is a robust variable in growth regressions, so that building endogenous growth models with human capital as the engine of growth seems to be justified. When the government can influence the process of human capital formation by adequate expenditures, it may finance these measures by the tax revenue and by public deficits. As concerns deficit finance of productive public spending in endogenous growth models with an infinitely lived representative individual, one realizes that a deficit financed increase in public spending leads to higher long-run. The reason for this outcome is that deficit finance of the government does not have any distortions in the model with an infinitely lived individual. Consequently, the growth stimulating effect of higher productive spending dominates and leads to a higher balanced growth rate.

Despite there being many factor that affect the growth rate of an economy, human development has been identified as the most prominent factor in recent decades by researchers. Recent decades have seen an explosion in research, both theoretical and empirical, that attempts to focus on the correlation between human development and economic growth. Thus, it is crucial that we review the related literature, if we are to understand the precise relationship between these two variables. This section briefly reviews the relevant empirical and theoretical studies, and then goes on to discuss the

findings of existing empirical studies that pertain to the human development–economic growth nexus.

The linkages between economic growth and human development, have been studied and discussed by Narayan and Smyth (2004). A strong linkage was found between economic growth and human development (Ranis, Stewart and Ramitez, 2000). Judson (2002) states that even though conventional wisdom does support a positive correlation between output growth and human development, the empirical results are mixed, that the positive correlation between growth and human development has been found exceptionally rather than as a rule. So, examining the causality between human development and economic growth for Nigeria is the need of a day.

According toT aniguchi and Wang (2003), education and health both cause each other and thus contribute in economic growth. Weil (2001) findings related to health-growth nexus further strengthen the importance of health for economic growth. The study concludes that 17-20% of variations in income across countries is due to differences in health status. Agiomirgianakis et al. (2002) conduct panel study (consisting of 93 countries) on subject matter and find significant positive long-run impact of education (primary, secondary and tertiary) on economic growth. Bloom et al. (2004) try to investigate the impact of human capital on economic growth. By utilizing, 2S L S approach they find that schooling and life expectancy both positively contribute to economic growth. Improvements in health standards are associated with increase in output due to increased labor productivity and capital accumulation. Seebens and Wobst (2003); Moser and Eliot (2005) both have asserted that in the long-run education (human capital) increases substantially household income aswell as economic growth. However, other studies including Bils and Klenow (2000), Easterly and Levine (2001), Temple (2001), Bosworth and Collins (2003) have failed to establish positive association between human capital (years of schooling) and economic growth.

In the case of Nigeria, most of the studies have used micro data on human development and these studies conclude that education brings significant positive returns for wage earners (for details see Lawal & Wahab, 2011; Babatunde & Adefabi, 2005;Adawo, 2011). Using macro data in a comparative analysis of Nigeria Kehinde (2013) find overall significant and positive impact of human capital (school enrollment rates as a proxy) on economic growth during 1970-2010. They use higher secondary, secondary and primary enrolment rates for observing the role of education in economic growth. They employ cointegration on standard growth model augmented with variables of enrolment rates. The results of the study reveal that both primary, secondary and post-secondary enrolment rate have positive and significant impact on economic growth in Nigeria. Other studies include Jelilov, Aleshinloye and Onder (2016); Javed (2013); Mba, Mba, Ogbuagor & Ikpebu (2013); Asghar, Awan & Rehman (2012); Kodabakhshi (2011); Qadri & Waheed (2011); Afzalet al. (2009);

Haldar & Mallik (2010); Abbas & Peck (2008); Narayan & Smith (2004) Anas, Aminu, & Zainab, (2017) among others.

The methodologies used are mostly OL S, 2L S, conventional cointegration methods (such as, Johansen, Johansen and Juselius, Gregory and Hansen), error correction model and causality tests. A number of empirical studies have reported a strong and positive relationship between human capital and economic growth. However, the causality test results are mixed. While Asghar, Awan & Rehman (2012) documented a unidirectional causality running from human development to economic growth, opposite is the case in Narayan & Smith (2008) and Haroon (2001) where the causality runs from economic growth to human capital. Moreover, bidirectional causality is found in Al-Yousif (2008).

After reviewing empirical literature on the subject matter it is evident that in case of cross country studies empirical results remained inconclusive whereas in a single country analysis mostly studies support positive association between human development and economic growth. However, it is observed that different studies have used different proxies for human development and difference in measurement of human development may be a source of bias in their empirical results. Furthermore, it can be concluded that earlier studies have used education as a proxy for human development and more recent studies lay emphasis on both health and education as a proxy for human development. The existing literature on Nigerian economy shows that appropriate proxies of human development are not used along with recent advances in dynamic modeling.

There exists a gap in the literature regarding the role of human development on economic growth in Nigeria. The present study is an attempt to bridge this gap by analyzing the causal relationship between human development and economic growth using recent advances in dynamic modeling and more appropriate proxies for human development (human development index). The results of this study may be helpful for policy makers in designing appropriate policies giving priority to the development of human capital development.

3.0 Methodology

This study uses econometric techniques to analyze historical time series data. These econometric techniques include: Augmented Dickey–Fuller (ADF) to test for a unit root in the individual data series (Dickey & Fuller, 1981); Johansen Cointegration to test for the integration of all the data series (Johansen, 1991); ECM to estimate the model; and Pairwise Granger Causality Test to determine the direction of causality between human development and economic growth in Nigeria (Engle & Granger, 1987). The proxy for economic growth for this study is Real Gross Domestic Product (RGDP) and human development is proxied by human development index as used by Adediran (2010) and Bils and Klenow (2000). The major source of data for this study is CBN Statistical Bulletin and UNDP report on Human Development index of 2015. Thus, the basic model for this study is

RGDP = f(HDI, GCF)……..……..……..……..……..……..4

$LRGDP_t = \beta_0 + \beta_1 LHDI_{t-i} + \beta_2 LGCF_{t-i} + \varepsilon_t$……..……...5

Where: LNRGDP = Natural log of real gross domestic product; f = function; LNHDI = Natural log of human development index; LNGCF = Natural log of gross capital formation β_1 and β_2 = Slope Coefficient; and β_o = Intercept; ε_t = Stochastic or Error Term in Time t.

3.1 Estimation Procedure

3.1.1 Augmented Dickey–Fuller (ADF) Unit Root Tests

For this purpose, the study uses the conventional Augmented Dicky-Fuller (ADF) unit root tests as a tool for identifying stationarity (or non stationarity) of a variable by running OLS regression of levels variables on their lag values.

$\Delta Y_t = \alpha_0 + \alpha_1 X_{t-1} + \Sigma^n_{i=1}\alpha_i \Delta Y_{t-i} + \varepsilon_t$……..…6

Where α and β are parameters, ε is assumed to be a white noise, ΔY_{t-i} expresses the first difference of the variable with p lag, $\Delta Y = Y_t - Y_{t-i}$ is a stationary series if $-1 < p < 1$. If p =1, Y is a non-stationary series; if the process is started at some point, the variance of y increases steadily with time and goes to infinity. If the absolute value of p is greater than one, the series is explosive. Therefore, the hypothesis of a stationary series can be evaluated by testing whether the absolute value of p is strictly less than one. If the series is correlated at higher order lags, the assumption of the white noise disturbance is violated.

3.1.2 Johansen Cointegration to Test

$$X_{1,t} = \alpha + \beta_2 X_{2,k} + \beta_3 X_{3,k} + \cdots + \beta_k X_{k,t} + \epsilon_t$$……..…..…...…7

The Johansen test approaches the testing for cointegration by examining the number of independent linear combinations (k) for an m time series variables set that yields a stationary process.

3.1.3 Error Correction Model

The error correction model (ECM) is adopted to establish a short run relationship between dependent, independent variables and error term (residual). The justification for ECM is that, it distinguishes between short run and long run responses and it allows direct estimation of the speed adjustment towards long run

$\Delta RGDP_t = \beta_0 + \beta_1 \Delta HDI_{t-i} + \beta_2 \Delta GCF_{t-i} + \beta_3 EC_{t-1} + \varepsilon_t$ ……..….8

Where: Δ = Is the first difference operator and $\alpha_5 EC_{t-1}$ = Error correction model. It reflects the short run dynamics of the model. It measures the speed with which short run equilibrium adjust to the long run equilibrium. However, it is expected to have a negative sign.

3.1.4 Pairwise Granger Causality Test

$$y(t) = \sum_{i=1}^{\bar{n}} \alpha_i y(t-i) + c_1 + v_1(t)$$

$$y(t) = \sum_{i=1}^{\bar{n}} \alpha_i y(t-i) + \sum_{j=1}^{\bar{n}} \beta_j x(t-j) + c_2 + v_2(t) \quad \text{…….…….....9}$$

Granger causality model helps to measure the precedence and information content on variables.

4.0 Results and Discussion of Findings

Table 1: Augmented Dickey–Fuller Stationarity Results

Variable	At levels	At 1st difference	At 2nd difference	Order of integration
LNRGDP	10.53697	-1.554496	-3.147652	I(2)
LNHDI	-5.617397	-2.939623	-14.80450	I(0), I(1), I(2)
LNGCF	4.036102	-1.256389	-5.801207	I(2)
Note	Critical value	Critical value	Critical value	
	1% = -2.771926	1% = -2.972154	1% = -2.816740	
	5% = -1.974028	5% = -1.977738	5% = -1.982344	
	10% = -1.602922	10% = -1.602074	10% = -1.6114	

Source: Researchers' estimation using E-Views software

Table 1 shows the results of the ADF test carried out. The unit root test reveals that all the variables are stationary at different stages, that is, LRGDP is of order I(2), LHDI is of order I(0), I(1) and I(2), and LGCF is of I(2). Therefore, it is necessary to carry out the cointegration test to ascertain whether the variables have a long-run equilibrium relationship.

Table 2 presents the Johansen cointegration results. It shows a cointegrating equation(s) at 0.05 level of significance in Trace and Max-Eigen test. This means that there is a long-run relationship existing between the variables of the study.

Table 2: Johansen Cointegration Results, Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eingen value	Trace statistics	0.05 percent critical value	Prob **
None*	0.973952	65.47110	29.79707	0.0000
At most 1*	0.801593	25.34513	15.49471	0.0012
At most 2*	0.496750	7.553356	3.841466	0.0060

*Source: Researchers' estimation using E-Views software; Trace test indicates 3 cointegrating eqn(s) at the 0.05 level; * denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values*

The coefficient of the error correction term (0.84) appears with positive sign and statistically significant at 5% level. It indicate that the divergence from equilibrium will take place with a speed of 84% and thus, the explanatory variables are adjusted

Table 3: Error Correction Model (ECM) Estimates and Residual Statistics

Dependent Variable: LRGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LHDI(-1)	2.558878	0.320486	7.984358	0.0000
LGCF(-1)	0.107799	0.016667	6.467671	0.0002
C	11.78663	0.362316	32.53137	0.0000
$ECT_{t-1}(-1)$	-0.837079	0.165323	5.063287	0.0010
Diagnostic test				
Test	Statistics		Prob	
R-Square	0.99			
DW-Stat	2.16			
LM test	0.10		0.04	
ARCH test	3.20		0.36	
Jacque-Bera	0.90		0.64	

Source: Researchers' estimation using E-Views software

by 84% of the past year deviation from equilibrium. Also, the coefficient of the explanatory variables LHDI (2.56) and LGCF (0.11) are statistically significant and again their signs are correct. These suggest that the model has captured the effects of human development on economic growth in Nigeria.

Table 4 shows the direction of causality using pairwise Granger Causality test. Human development index and gross capital formation granger cause real GDP in Nigeria and no feedback from real GDP. However, the results show a unidirectional causality, running from human development to economic growth in Nigeria.

Table 4: Pairwise Granger Causality Tests Results

Null Hypothesis	Obs	F Statistic	Probability	Remark
LHDI does not Granger Cause LRGDP		0.24727	0.7885	Accept
LRGDP does not Granger Cause LHDI	11	7.06213	0.0265	Reject
LHDI does not Granger Cause LRGDP		4.34281	0.0682	Accept
LRGDP does not Granger Cause LHDI	11	0.66140	0.5501	Accept
LGCF does not Granger Cause LHDI		2.51027	0.1614	Accept
LHDI does not Granger Cause LGCF	11	0.21067	0.8158	Accept

Source: Researchers' estimation using E-Views software

5. Conclusion and Recommendations

This study examined human development and economic growth in Nigeria: an empirical study. The study estimated economic growth using Johansen cointegration, error correction mode and granger causality technique. In particular, economic growth's responsiveness to human development and gross capital formation has been estimated. The HDI estimate of RGPD for the ECM model is 2.56 and LGCF is 0.11and both are statistically significant with correct signs correct. The error correction term was found significant with an adjustment coefficient of 0.84. It indicates that in the case in which we are off the long run revenue curve, standard of living adjusts toward its long run equilibrium at a relatively average rate, with about 84% of the adjustment occurring within the first year.

In summary, the variables of this study, that is, real GDP, Human development index and gross capital formation have a long-run relationship amongst them for the period 2003 to 2015 in Nigeria. The findings of this study gain support from the studies of Barro and Sala-iMartin (1995), Krueger and Lindahl (1998), Asghar, Awan & Rehman (2012), Narayan & Smith (2008) and Haroon (2001), and Al-Yousif (2008).This is a conclusive result from the empirical analysis that also finds that there

exists a long-run relationship among the variables of the study. The study recommends as follows:

i. There is need for government to improve on indices of human development indices (that is education and health). Improving on these indices will go a long way in improving the productive capacity of the people and hence translate to improvement in economic growth in Nigeria.

ii. Giving the existence of the significant long-run relationship between human development index and economic growth, there is need for government to increase investment in education sectors. More funds as percentage of GDP should be allocated to education sector in line with other sectors. Government should further formulate and implement effective economic policies related to the provision of education and health facilities to the people to support the innovative technological progress which increases productivity and thus accelerates the economic growth. The fact that national policies and reform programs influence the behaviour of education and health outcomes, this study recommends that policy makers should prioritize these sectors and devote attention to policy determinants of education and health as a mechanism for promoting economic growth in Nigeria. Government at federal and state should cooperate in promoting the importance education to the people on priority basis.

iii. More resources should be allocated for development of potential human development areas such education and research, this will help in innovations and technological improvement and increase economic growth through excessive productivity.

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