



## Human Capital Formation and Economic Growth in Nigeria

**Godwin Emmanuel Oyedokun**

*Department of Accounting, Nasarawa State University, Keffi, Nasarawa State, Nigeria*

**Ayodeji Babatope Adeyemi**

*Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Nigeria*

### Abstract

*This study investigates how the development of human capital is related to economic growth in Nigeria from 1980 to 2015. Data were sourced from the Central Bank of Nigeria and the National Bureau of Statistics. The study employed Augmented Dickey-Fuller (ADF) to estimate the relationship among the variables used in this study which revealed that there is a positive long-run relationship among public expenditure on education and health, total school enrolment, gross capital formation, employment rate, life expectancy rate and economic growth. The study recommended that the government should put in place the required education and training policy that would guarantee quality schooling for different level of education. Government should also commit more funds to health sector to enhance human capital formation. It was also recommended there should be more pragmatic means to develop human capabilities.*

**Keywords:** *Human Capital formation; Economic growth; Education; Government policy; Human capital*

**JEL classification:** *J24; E24*

### Introduction

The major source of per capital output in any country; whether developing or developed, with a market economy or centrally planned is an increase in productivity. Per capita output growth is, however, an important component of economic welfare, Abramowitz (1981). From experience, it has been revealed that human beings are the most important and promising source of growth in productivity and economic growth. Equipment and technology are products of human minds and can only be made productive by people. The success of any productive program depends on human innovative ideas and creativity.

The impact of human capital formation and economic growth in recent times emphasized the growth theory (Romer, 1986; Lucas, 1988). An interesting idea in their work was that in the long run, output per unit of input could increase even when inputs were exhaustively accounted for. Technically advanced human capital and a growing knowledge base appear to be part of this wellspring of growth. An implication of Lucas' hypothesis on human capital is thus associated with investment in man and his development as creative and productive resources Harbison

(1962).

As the global economy shifts towards more knowledge-based sectors (e.g. the manufacture of ICT devices, pharmaceuticals, telecommunications and other ICT based services, research and development), skills and human capital formation becomes a central issue for policy makers and practitioners engaged in economic development both at the national and regional level OECD (1996); yet the impact education and vocational training activities exert upon changing national and regional economies remain less than thoroughly explained and analyzed. Since the introduction of human capital theory in the 1960s, a number of studies have attempted to address this and related issues. Today, the global economy is divided into two parts comprising of a few rich nations regarded as the developed countries (DCs) and many poor nations regarded as the less developed countries (LDCs). DCs are characterized by high productivity while the LDCs are characterized by low productivity. According to the level of human capital development and per capita income, Nigeria is classified under the LDCs.

Nigeria as a country is immensely endowed both in natural and human resources. The pool of resources from one end to the other is unquantifiable to such extent that, given a dynamic leadership, economic prosperity would have been achieved in the late 20th century. The primary focus of Nigeria has been finding a way to accelerate the growth rate of national income and to engage in structural transformation of her subsistence and resource-based economy to production and consumption based economy in order to break the cycle of poverty and low productivity. In spite of all these abundant resources, Nigeria has failed to realize her full development potential with the topmost priority currently given to sustainable human capital development or people-oriented development by many countries and multilateral organizations, e.g. United Nation Development Programme. A review of the Nigerian economy has become quite appropriate as a way of understanding more comprehensively her human capital formation.

Human capital refers to the abilities and skills of human resources and human capital formation refers to the process of acquiring and increasing the number of persons who have the skills, education and experience which are critical for the economic growth of the country Harbison (1962). Therefore, what really matters in Nigeria are the empowerment of people and the mobilization of the economic surplus into productive investment channels. There is also the need for the Nigerian economy to eliminate or minimize those constraints towards human capital formation so as to enhance rapid economic growth.

Nigeria is a country endowed with natural and human resources, and, therefore, has the potential to achieve rapid economic growth. Paradoxically the nation has witnessed slow economic growth despite the presence of these resources. Noting this phenomenon, Udabah (1999:69), stated that "although an abundance of natural resources might appear to give a country a head start on development, it may not however necessarily guarantee development nor does their absence guarantee backwardness as there exist many developing nations with abundant natural resources that command potential value in the world market but remains largely untapped". It is clear from this statement that human capital formation is highly required for meaningful economic growth and sustainability to exist. A formal plan for human capital formation in Nigeria was made during the implementation of the 1955 – 1960 national development plans and today, with the importance of knowledge in the economy the subject, has increasingly attracted both academic and public interest. Also, there has been the inability to effectively strategize on how efficiently allocate resources to the health and education sector in order to enhance economic growth. The missing link in Nigeria, however, has been the inability of the country to ensure systematic, sustainable and strategic plan to make an enduring impact on human capital formation for a sustainable economic growth that can lead ultimately to economic development.

Misappropriation and mismanagement of public fund is also a major problem of human capital. This has led to a shortage of skilled personnel, unemployment and above all poverty. There can be no significant growth in any country without adequate investment in human capital. A typical example is the Asian tigers; Taiwan, Singapore; whose economies experienced sharp improvements via substantial investment in human capital.

The rate of illiteracy is very high. Most of the workers are unskilled and they make use of outmoded capital, equipment and methods of production. By implication, their marginal productivity is extremely low and this leads to low real income low savings, low investment and consequently low rate of capital formation.

Other issues surrounding the development of human capital within the Nigerian economy includes; Uneven distribution of skilled manpower, Misemployment of human capital in Nigeria, Poor reward system retarding the acquisition and development of human capital.

Therefore, this study sought to determine how the development of human capital is related to economic growth in Nigeria.

## **Literature Review**

### **Conceptual review**

Capital is referred to as 'those factors of production used to create goods or services that are not themselves significantly consumed in the production process' while, the human element takes charge of all economic activities such as production, consumption, and transactions necessary to move the products to the consumers Boldizzoni (2008). This implies that human capital is a key production element that adds value to the production process. In the 1950s, it was discovered that investment on human capital was the primary way to raise an individuals' wages making it more effective when compared to other production inputs such as land, financial capital, and labour force, Woodhall (2001).

Human capital refers to the abilities and skills of human resources and human capital development refers to the process of acquiring and increasing the number of skilled persons who have the education and experience which are critical for the economic growth of the country Harbison (1973). Human capital in Nigeria is produced mainly in the schooling sector. The government uses public resources for education in the schooling sector such as expenditures for books, teaching material and other inputs in the process of human capital formation. Thus, the input in the schooling sector is composed of time spent on education by the individual and of schooling expenditures by the government.

Human capital as defined by Schutz (1993) is the key element in improving firms' asset and employees in order to improve productivity as well as sustain competitive advantage. Human capital becomes a tool for competitive advantage since it involves the process of training, knowledge acquisition (education), initiatives and so on; all these are geared towards skill acquisition. Human capital development is human-centered because its major concern is on human empowerment which would lead to active participation. According to OECD (2001), human capital is concerned with knowledge, skills competitiveness and attributes embedded in an individual that facilitates the creation of personal, social and economic wellbeing. In order to achieve positive economic growth in Nigeria, human capital development should be considered as an integral and important factor for economic growth. A major challenge facing the global community and Nigeria at large is how to achieve sustainable development. The three pillars of sustainable development cannot be achieved if human capital development doesn't come to play as an integral part. In Nigeria, the annual federal government budget to the educational sector (in percentages) is nothing to talk about, statistics show that the percentages over the years are not in line with the United Nations Educational Scientific and Cultural Organization's (UNESCO) recommendation of 26.0% it was discovered that from 2005-2007, the percentage was 6.3%, 7.8%, 8.7% respectively. A poor country is a country, which never invested sufficiently in its human capital development and the citizens who are supposed to be at the centre of the economic growth would be poverty-stricken

Human capital development is a means of developing skills, knowledge, productivity and inventiveness of people through the process of human capital formation. It is a people-centered strategy of development which

is recognized as an agent of national development in all countries of the world. Providing education and health services to people is one of the major ways of improving the quality of human resources. The theory of human capital development emphasizes how education and good health increases the productivity and efficiency of the people.

Education and health are fundamental to economic growth and development and are one of the key determinants of economic performance both at the micro and macro levels. This derives from the fact that education and health are both direct component of human well-being and a form of human capital that increases an individual's capabilities (Bloom & Canning, 2003). Grossman (1972) has equally demonstrated that education and health are forms of human capital. Schultz (1992) argued that population quality is the decisive factor of production and emphasized the intrinsic worth of investing in education and health.

In human capital development, education is essential. Education is concerned with the cultivation of the whole person including intellectual, character and psychomotor development. It is the human resources of any nation, rather than its physical capital and material resources, which ultimately determine the character and pace of its economic and social development. Human capital is an all-embracing concept, that is, it is a continuum, a continuing process from childhood to old age, and a must for any society that wishes to survive under the complex challenges of a dynamic world. The concept of human capital has shifted the focus of economic development theorists to generally agree that the quality of human capital has a significant impact on economic development and growth. This body of thinking is of the opinion that the quality and quantity of labour determine the production by virtue of it being a major factor of production. Moreover, improving the quality of the labour force yields implicit, non-economic outputs related to the generation of ideas and decisions which have a significantly positive impact on investment, innovation and other growth opportunities (Adebiyi, 2006; Roux, 1994).

The role of human capital development cannot be emphasized. The development of human capital has been recognized by development economists to be an important prerequisite and an invaluable asset for a country's socio-economic development. This can only be achieved through increases knowledge, skills and capabilities acquired through education and training by all the people in the country.

The concept of human capital refers to the abilities and skills of the human resources of a country, while human capital formation refers to the process of acquiring and increasing the number of persons who have the skills, education and experience that are crucial for the economic growth and political development of a country, NES (2002). Yesufu (2000) is of the views that the essence of human resources development becomes one of ensuring that the workforce is continuously adapted for, and upgraded to meet, the new challenge of its total environment. This is because the economy is a dynamic entity, which is constantly changing in response to various stimuli such as introduction and discoveries of new products or techniques of production. Therefore, those already on the job require retraining, reorientation or adaptation to meet the new challenges. This special human capacity can be acquired and developed in different ways, namely; education, training, health promotion as well as investment in all social services that influence man's productive capacities, including telecommunications, transport and housing. He concluded that education and training are generally indicated as the most important direct means of upgrading the human intellect and skills for productive employment.

In recognition of the importance of human capital development, the United Nations Economic Commission for Africa (1991) has described human resources as the knowledge, skills, attitudes, physical and managerial effort required to manipulate capital, technology, land and material to produce goods and services for human consumption. In the same vein, Mahroum (2007) suggested that at the macro-level, human capital management is about three key capacities namely; the capacity to develop talent, the capacity to deploy talent, and the capacity to draw talent from elsewhere. Collectively, these three capacities formed the backbone of any country's human capital competitiveness. In a collaborative view, Simkovic (2013) sees human capital as the most important element of success in business today. So developing human capital requires creating and cultivating an environment in which human beings can rapidly learn and apply new ideas, competencies, skills, behaviour and attitudes. It could, therefore, be deduced that human capital

represents the stock of competencies, knowledge, habits, social and personality attributes, including creativity, cognitive abilities, embodied in the ability to perform labour so as to produce economic value.

Since the introduction of human capital theory in the 1960s, a number of studies have attempted to address the concept and related issues. Today, the whole world is regarded as a global village which is divided into developed and developing nations. The developed nations are the few rich and industrialized nations with high productivity as a result of the available human capital, while the developing ones are the poor nations with low productivity as a result of human capital available. Romer (2009) posits that the difference between developed and developing nations is more pronounced in human capital. Nigeria is categorized under the developing nations; however, the country is immensely endowed with natural and human resources needed for high productivity to be among the developed nations of the world. Adelakun (2011) is of the view that the pool of resources from one end to the other in Nigeria is unquantifiable to such an extent that, given dynamic leadership, economic prosperity would have been achieved in the late 20th century. The primary focus of Nigeria has been looking for ways to accelerate the economic growth rate of national income and to engage in structural transformation of her subsistence and manufacturing-based economy to a knowledge-based economy in order to break the cycle of low income, low standard of living and low economic growth.

Human capital can be interpreted in many ways. One of them could be looking at the person as an asset or resource that belongs to the organization and from which we can demand all its capacity and commitment (Tohmatsu, 2014, Ajibola, 2012 and UNDP, 2004). Martinez (2014) posits that a more sustainable definition about this term is that human capital is a treasure that a company, institution or country has available with respect to the qualifications of the personnel that work there. In an organizational context, Business Dictionary (2014) refers to human capital as the collective value of the organization's intellectual capital (competencies, knowledge and skills). This capital is the organization's constantly renewable source of creativity and innovativeness. It impacts on its ability to change but it is not reflected in its financial statements. Therefore, it could be summarized that human capital represents the value that each employee brings to the table, according to the type of education received, educational qualification, capabilities and skills.

Human capital formation is a factor that must exist for the national economy to grow. It teaches people how to utilize the power of diverse thinking styles (analytical and intuitive) to achieve a holistic best practical solution to emerging issues. Enyekit, Amaehule and Teerah (2011) posits that human capital development and training and development are basically the same and can be used interchangeably. Chima (2014) reports that Salami (2013) describes human capital development as a fundamental challenge confronting Nigerian economic growth at the Red Merchant Banks Investors' conference in Lagos. He stresses the need to design education policies that would supply the education needs, competence and creativity in the country. Fara (2008) refers to human capital development as an effort to provide education which will increase human knowledge, enhance skills, productivity and stimulate resourcefulness of individuals. Thus, human capital development is about investing in human resource through training, coaching, internship and human capital management with a view to increasing human knowledge; enhance skills through education, training and experience for increased productivity. Therefore, what really matters in Nigeria, according to Erinoso (2010), is the need to empower people through education and commensurate employment opportunities towards the realization of economic surplus. There is also the need for the Nigerian economy to eliminate or minimize those constraints militating against economic growth by providing human capital formation programme needed by society so as to enhance rapid economic growth.

From the foregoing, it is clear that low human capital formation in addition to non-conducive environment and political challenges constitute the problems confronting the Nigerian economy. Focusing on human capital development, the problem facing it can be traced to the type of education on offer, unaffordable cost of education to an average family, the replacement of human capital with technological equipment, lack of effective vocational Training/IT centres and research institutes, mismanagement of available funds in the education sector, among others. However, for the purpose of this study, human capital is measured with education and employment.

The term economic growth can be viewed from two different perspectives. Some view it as the total increase in the level of individuals' income within the country. This position holds in this paper as a measure of economic growth. Farah (2008) defines it as potential growth in the income of each individual that forms the working group in a country as a result of their level and type of education. Also, Kathleen (2012) defines it as an increase in the bargaining power of individuals to demand more goods and services produced within the economy over time. Coechy (2011) posits that economic growth is conventionally measured by the level of education and commensurate employment opportunity provided. Ghachukha (2009) views it as the percentage rate of increase in real income of individual over a period of time.

Others view economic growth from the gross domestic product or real GDP. Of more importance is the growth of the ratio of GDP to population (GDP per capita), which is also called per capita income. An increase in per capita income can be referred to as intensive growth. Some view economic growth as an area of study which is different from development economics. The former is primarily the study of how countries can advance their economies. The latter is the study of the economic aspects of the development process in low-income countries. In economics, Erinoso (2010) posits that economic growth typically refers to the growth of potential output, that is, production at full employment. Todaro (2013) views it as an increase in the amount of goods and services produced per head of the population over a period of time. So also, UNDP (2004) posits that it is the increase in market value of the goods and services produced by an economy over time which is conventionally measured by the percentage rate of increase in real gross domestic product or real GDP.

Economic growth comprises sustained, concerted actions of communities and policymakers that improve the people's standard of living and economic health of every individual in the country at large. Todaro (2013) defines it as an increase in living conditions, improvement of the citizens' self-esteem needs and a free and just society. He suggests that the most accurate method of measuring economic growth is the human formation index which takes into account the literacy rates/level of education, employment and life expectancy and which in turn has an outright impact on income and could lead to economic growth.

### **Theoretical Review**

As the global economy shifts towards more knowledge-based sectors (e.g., the manufacture of ICT based services, R&D) skills and human capital formation becomes a central issue for policy makers and practitioners engaged in economic development, both at the national and regional levels, OECD (1996). Yet, the impact of education and vocational training activities exert upon changing national and regional economies remains less than thoroughly explained and analyzed. Since the introduction of human capital theory in the 1960s, a number of studies have attempted to address this and other related issues. Human capital theory views schooling and training as an investment in skills and competencies, Schultz (1960 and 1961). It is argued that based on the national expectation of return on investment, individuals make decisions on the education and training they receive as a way of augmenting their productivity. A similar strand of studies focuses on the interaction between the educational/skills levels of the workforce and measurements of technological activities, (Nelson and Phelps, 1966). According to this theory, a more educated/skilled workforce makes it easier for a firm to adopt and implement new technologies, thus reinforcing returns on education and training. Empirical studies provide evidence supporting the aggregate effects of education and training. This theory shows how education leads to an increase in the productivity and efficiency of workers by increasing the level of their cognitive skills. Theodore, Schultz, Gory Bucker and Jacob Mincer introduced the notion that people invest in education or as to increase their stock of human capabilities which can be formed by combining innate abilities with investment in human beings Babalola (2000). Examples of such investments include expenditure on education, on- the- job training, health, and nutrition. However, the stock of human capital increases in a period only when gross investment exceeds depreciation with the passage of time, with intense use or lack of use. The provision of education is seen as productive investment in human capital, an investment which the proponents of human capital theory consider to be equally or even more equally worthwhile than that in physical capital. Human capital theorists have established that basic literacy enhances the productivity of workers' low skill occupations.

They further state instruction that demands logical and analytical reasoning that provides technical and specialized knowledge increases the marginal productivity of workers in high skill or profession and positions. Moreover, the greater the provision of schooling in society the greater the increase in national productivity and economic growth.

Neoclassical growth theory seeks to understand the determinant of long-term economic growth through the accumulation of factor inputs such as physical capital and labour. Studies revealed a significant contribution from technical progress, which is defined as an exogenous factor. Solow (1957) and Swan (1956) are among those who first demonstrated this. Neoclassical Model is an aggregate production function which exhibits a constant return to scale in labour and reproducible capital.  $Y = f(K, L)$  Solow (1975) modified the above model by supposing there is productivity (or technology) parameter  $A$  in the aggregate production function that reflects the current state of technological knowledge.  $Y = f(\bar{A}KL)$  an obvious limitation of the Solow-Swan Model is its failure in accounting for the cause of technological progress. The model shows that technological progress contributes to economic growth but it does not spell out how it takes place (The rate is set exogenously). The justification of Solow (1957) was that technological change originated from knowledge produced by public science base (e.g. investigating public research institutes) which is outside the domain of the economic system.

One of the assumptions of Frankel's Model is  $\bar{A}$  which is technological progress is endogenous to the economy (related to changes in  $K$  &  $L$ ). The model puts forward that output grows in proportion to capital because of the effect of knowledge creation activities that counteract diminishing returns. Romer in his seminal paper extended Frankel model ( $y = AK$ ) by introducing a lifetime utility function exhibits positive utility to diminishing marginal utility. He assumed a production function with externalities of the same form as considered by Frankel that labour supply of a firm is utility ( $L=1$ ). He says more of these externalities will produce new technological knowledge and therefore the economy will grow. The assumption that accumulation of knowledge is still external in the relationship does not explicitly express how knowledge creation is remunerated and this brought about the second Romer Model. Here Romer focused on production function of knowledge by research workers. This model assumed that technological knowledge in labour augments and enhances their productivity. The production function expressed as  $Y = K\alpha(AL)^{1-\alpha}$ . The Model assumed that research workers create technological knowledge. It is planned to see that the more researchers, the newer ideas are created, the larger the existing stock of knowledge and the new idea that is produced (effect of externalities).

The Solow-Swan model is considered an "exogenous" growth model because it does not explain why countries invest different shares of GDP in capital or why technology improves over time. Instead, the rate of investment and the rate of technological progress are exogenous. The value of the model is that it predicts the pattern of economic growth once these two rates are specified. Robert Solow and Trevor Swan developed what eventually became the main model used in growth economics in the 1950s. This model assumes that there are diminishing returns to capital and labour. Capital accumulates through investment, but its level or stock continually decreases due to depreciation. Due to the diminishing returns to capital, with increases in capital/worker and absent technological progress, economic output/worker eventually reaches a point where capital per worker and economic output/worker remains constant because annual investment in capital equals annual depreciation. This condition is called the steady state.

If productivity increases through technological progress, then output/worker increases even when the economy is in the steady state, if productivity increases at a constant rate, output/worker also increases at a related steady-state rate. As a consequence, growth in the model can occur either by increasing the share of GDP invested or through technological progress. But at whatever share of GDP invested, capital/worker eventually converges on the steady state, leaving the growth rate of output/worker determined only by the rate of technological progress. As a consequence, with world technology available to all and progressing at a constant rate, all countries have the same steady-state rate of growth. Each country has a different level of GDP/worker determined by the share of GDP it invests, but all countries have the same rate of economic growth. Implicitly in this model rich countries are those that have invested a high share of GDP for a long time. Poor countries can become rich by increasing the share of GDP they invest. One important prediction of the model, mostly borne out by the data, is that of conditional convergence; the idea that poor countries

will grow faster and catch up with rich countries as long as they have similar investment rate, saving rate and access to the same technology.

### **Empirical literature**

The relationship between human capital development and economic growth in Nigeria has been empirically investigated by researchers in Africa, emerging and developing economies and Nigeria. These studies include:

Soderbom and Francis (2003) empirically analyzed the openness and human capital as sources of productivity growth and the outcome indicated significance at the ten per cent level, of the level of human capital on the level of income but no effect on underlying productivity growth.

Seid et al (2010) researched education's contribution to the economic growth of Sub-Saharan Africa and the result showed that there is a positive correlation between growth and various definitions of human capital. Hyun (2010) studied the concept of human capital development in Africa and discovered that as human capital increases; employment growth elasticity will decrease, making the economy less labour-intensive, resulting in higher economic growth. He advised that attention is paid to the micro linkage between human capital and the labour market. Oluwatobi and Ogunrinola (2011) looked into the relationship between human capital developments efforts of the Government and economic growth in Nigeria. The result showed a positive relationship between government recurrent expenditure on human capital development and the level of real output, while capital expenditure showed a negative relationship related to the level of real output. They recommended the appropriate channelling of the nation's capital expenditure on education and health to promote economic growth.

Ewert and Johannes (2012) accounted for human capital constraints in South Africa. The result indicated that education and labour market distortions have varying influence on output per worker and the highest percentage of the total variance is explained by latent variables that incorporate education, training, compensation, region and sector education training authority (seta) support and effectiveness. Eric (2013) focused on the role of human capital in economic growth in developing countries and discovered that issues of school quality in developing countries have been much less successful in closing the gaps with developed countries. He further stated that without improving school quality, developing countries will find it difficult to improve their long-run economic performance. Stephanie (2013) studied gender, development, and economic growth in Sub-Saharan Africa and the result identifies two key policy avenues for promoting growth enhancing gender equality and thus growth: a revised central bank focus on employment targets, and public investment to reduce women's care burden. William (2013) studied the subject matter of human capital development in Africa and the result showed that low public investment in education results in limited access to education, poorly motivated teachers and overstretched tools and facilities remain key challenges to Africa's human capital development. He recommended that the effect that: (a) Africa's human capital base can be enhanced through improved public investment in education in the area of teacher motivation and provision of adequate teaching and learning materials. (b) Implementation of measures to reduce pupil-teacher ratio and review of curricula will help to meet the development needs of countries. (c) Africa must encourage private sector participation in the provision of education to enhance effective collaboration between educational institutions and industry and adopt measures to reverse brain drain.

Ongo, Vukenkeng and Seppo (2014) used a panel data analysis to check the mechanisms of the influence of human capital on economic growth and the research revealed that: (a) Secondary education improves human capital development, (b) A good health system strengthens/increases the quality of capital, (c) Knowledge acquired on the job increases the productivity of the workers and (d) The accumulated human capital significantly impacts positively on the economic growth of the CEMAC region.

Pumela (2015) looked into the subject of human capital development in relation to what can South Africa learn from Botswana? The result indicated that the fundamental differences between South Africa and Botswana are education, health and wellness as well as workforce employment. Jude, Hilaire and Sossou (2015) analyzed education, health and economic Growth in African Countries and the result showed that public expenditures on education and health have a negative impact on economic growth, whereas human



capital stock indicators have a slightly positive effect. Furthermore, the result showed that education and health spending are complementary. They suggested that public investment in education and health should be jointly increased and their efficiency in order to expect the positive impact of human capital on growth in African countries. Elena (2015) analyzed the impact of human capital on economic growth and found that the role of human capital is a factor of growth and the slow investment in human capital influences the sustainable development of the countries.

Schutt (2003) examined the importance of human capital for economic growth. He found out that educational expansion does contribute to output growth and human capital has a substantial impact on technological catch-up, possibly through improving a country's capacity to adopt new technologies. Emanuele et al (2004) accounted for social spending, human capital, and growth in developing countries, using panel data from 120 developing countries from 1975 to 2000. It was found that both education and health spending has a positive and significant direct impact on the accumulation of education and health capital, and thus can lead to higher economic growth. In addition, other policy interventions, such as improving governance, reducing excessive budget deficits, and taming inflation, can also be helpful in moving countries toward the Millennium Development Goals (MDGs). Mohsin (2005) examined human capital and economic growth in Pakistan and found that accumulation of physical capital and improvements in the quality of institutions have the largest payoffs in terms of achieving higher growth, but that better education and health care also have a significant impact. He recommended that investment in these areas will increase the possibility of Pakistan entering a virtuous cycle of high growth and improved living conditions for the population.

Tom (2012) examined education and health in developing economies and discovered that in individuals, childhood health enhances schooling outcomes, longevity incentivizes human capital investment, and education improves adult health. Across generations, the health and education of parents; particularly mothers; boost both outcomes in their children. James and Junjian (2012) examined human capital, economic growth, and inequality in China. In the result, it was found that China's rapid growth was fuelled by substantial physical capital investments applied to a large stock of medium-skill labour acquired before economic reforms began. As a matter of recommendation, it was stated that China's growth will be fostered by expanding access to all levels of education, reducing impediments to labour mobility, and expanding the private sector.

Hanushek (2013) analyzed economic growth in developing countries. He found that there is a need to shift attention to issues of school quality, and developing countries have been much less successful in closing the gaps with developed countries. As a point of recommendation, he stated that without improving school quality, developing countries will find it difficult to improve their long-run economic performance. Shi (2014) empirically analyzed the relationship between human capital investment and economic growth in rural areas, based on the data of Henan. It was found that Human capital formation plays a striking role in economic development and investment also plays an important role in gross economic growth than material capital investment. Anabela and Aurora (2014) empirically analyzed economic growth, human capital and structural change. The result showed that the countries' productive specialization dynamics is a crucial factor in economic growth. It also showed that interaction between human capital and structural change promotes high knowledge-intensive industries and impacts on economic growth.

Debnath (2014) accounted for developing education and human resources in East Asian knowledge-based economies. The study revealed that advanced knowledge-based economies such as Japan, Korea, Taiwan, Hong Kong and Singapore are highly successful in the development of education and human resources in the region. Furthermore, due to the demographic transition, some economies started considering foreign labour force as an additional solution to supply the necessary human resources for their economic development. Parash (2015) examined the factors affecting economic growth in developing countries. It was revealed that a high volume of exports, plentiful natural resources, longer life expectancy, and higher investment rates have positive impacts on the growth of per capita gross domestic product in developing countries. It was recommended that more research needs to be done to distinguish the causes of growth in developing countries, as the scope of existing research is limited due to a lack of reliable data.

Adelakun (2011) studied human capital development and economic growth in Nigeria and his research revealed that human capital development is relevant to the growth of the economy. The study recommended that stakeholders need to evolve more pragmatic means of developing human capabilities since it is seen as an important tool for economic growth in Nigeria. In addition, a proper institutional framework should be put in place to look into the manpower needs of the various sectors and implement policies that will lead to the overall growth of the economy. Omojimate (2011) examined the process of building human capital for sustainable economic development in Nigeria. He found out that the sector lags behind in all the indicators used to assess its effectiveness. He recommended that major reforms should be undertaken in the sector including increased funding, an overhaul of school curricula and the introduction of a new incentive structure for school workers. Wakeel and Alani (2012) examined the contribution of different measures of human capital development to economic growth in Nigeria. They found that though little commitment had been accorded health compare to education, the empirical analysis showed that both education and health components of human capital development are crucial to economic growth in Nigeria.

Atoyebi et al (2013) empirically analyzed the relationship between human capital and economic growth in Nigeria and the result indicated that the high level of human capital development increases the utilization of resources both human and material. They recommended that the government should endeavour to provide an enabling environment by ensuring macroeconomic stability and increased investment in human capital by the individual. Ogujiuba (2013) analyzed the impact of human capital formation on economic growth in Nigeria. The result revealed that investment in human capital in the form of education and capacity building at the primary and secondary levels impact significantly on economic growth, while capital expenditure on education was insignificant to the growth process. He recommended that educational institutions in Nigeria should be re-structured for quality schooling at the primary, secondary and tertiary levels. Ifeoma et al (2013) examined the relationship between human capital development and economic growth in Nigeria. They found that there is a strong positive relationship between human capital development and economic growth. They recommended that there is need to pay attention to manpower needs of the various sectors of the economy. Martins and Muftau (2014) assesses human capital development in Nigeria through the lens of education. The study revealed that human capital development in Nigeria is inadequate and unable to galvanize the economy towards long-term stable growth. They recommended that emphasis should be placed on deliberately developing the country's vast human resources, with particular reference to the country's educational spectrum, if the goal of poverty alleviation, employment generation and wealth creation, all encapsulated in various policy documents over the years, are to be achieved.

Olugbenga and Azeez (2014) researched the concept of human capital development as a correlate of economic growth in Nigeria and discovered that economic growth is a function of individual income level. They recommended that the government should develop an appropriate educational policy to provide the human capital need of the society for economic growth. Enefiok and Sunday (2014) in their study of the impact of human capital development and economic empowerment on the socio-economic development of Akwa Ibom State, Nigeria, realized that from 1999 to 2012, the government is the foremost driver of the economy has made a positive impact on the training and retraining of workers in the public sector, which has made the public sector more vibrant, efficient and result-oriented. They recommended that government should embark on extensive training of domestic engineers in the areas of oil and gas in the state, and the government should encourage individuals and private sector to increase investment in human capital and economic empowerment in the state. Osekhebhen and Anaduaka (2014) examined human capital development and economic growth. They found out that human capital development is indispensable in the achievement of sustainable economic growth in Nigeria, as there is an increase in economic performance for every increase in human capital development. In addition, the study revealed a relatively inelastic relationship between human capital development and output level. They recommended that government and policymakers should make concerted and sincere efforts in building and developing human capacity through adequate educational funding across all levels.

Olalekan (2014) examined the impact of human capital on economic growth in Nigeria. His study revealed a relationship between human capital and economic growth in Nigeria. He recommended that special attention should be given to health and education sectors simultaneously in Nigeria, such as increased budgetary

allocation to the two sectors and to ensure proper implementation of programs in these two sectors in order to increase returns from these two sectors. Torruam and Abur (2014) in their study of the effect of public expenditure on human capital development as a strategy for economic growth in Nigeria discovered that human capital development has an impact on economic growth in Nigeria, which implies that if funds channelled into education and health sectors are properly managed and utilized efficiently it would improve the educational and health sectors.

Jaiyeoba (2015) analyzed the human capital formation and economic growth in Nigeria, and the study revealed that education and health policies are very important in the economic growth of Nigeria. The study recommended that in order to accelerate growth and liberate Nigerians from the vicious cycle of poverty, the government should put in place policies geared towards massive investment in education and health.

## Research and Methodology

### Research Design

This study adopted ex- post facto research design and made use of secondary data. Variables like public expenditure on health, public expenditure on education and gross capital formation were sourced from the World Bank development indicator while total school enrolments were sourced from the National Bureau of Statistics

Several theories have been applied by several scholars in examining the impact of human capital formation and economic growth, but, for the purpose of this study, the Solow growth model will be employed. In the earlier neoclassical model, human capital was not considered a major input for production and hence was not included in growth models. Perhaps, augmented Solow growth model could be seen as the pioneer in this direction. Solow incorporated human capital as one of the independent variables in his model. The model attributed the growth in national income to three sources namely: increase in the stock of physical capital, increases in the size of labour force, and a residual representing all other factors.

Solow uses the aggregate production function which is continuous and homogenous of degree one.

$$Y = AK^\alpha (hL)^\beta$$

Where Y is output level

K is stock of physical capital

h is the level of human capital

L is labour measured by a number of workers; A is level of a total factor of productivity;  $\alpha$  is the elasticity of capital input with respect to output while  $\beta$  is the elasticity of labour input with respect to output.

Economically, the model is specified as follows:

$$Y = AK^\alpha (hL)^\beta U$$

Where transformed into a log-linear form, we have,

$$\log Y = \alpha_0 + \alpha \log K + \beta \log hL + W$$

Where  $\alpha_0 = \log A$  and  $W = \log U$

To achieve a robust result in the context of the Nigerian environment, the augmented Solow human capital growth model would be modified to take an additional variable. This is government total expenditure on education comprising both the recurrent and capital expenditure. This additional variable is necessary because the development of the educational sector is one major way of achieving human capital formation.

The expanded model is stated as follows:

$$\log Y = \alpha_0 + \alpha \log K + \beta \log hL + \log GTEE + W$$

Output level (Y) is proxy by real gross domestic product; stock of physical capital (K) is represented by gross total capital formation stock of human capital (hL) is a product of total school enrolment (h) and total labour

force(L) terms. Human capital formation is measured by government total expenditure on education, a combination of both capital and recurrent expenditure, that is GTEE

### Model Specification

Generally, the specification of the economic model is based on Oluwatobi and Ogunrinola (2011) and on the available data relating to the human capital being studied. The study has employed and modified the model formulated in the works of Lucas (1988), Mankiw et al (1992), Gemmell (1996) and Ncube (1999). However, the research was built upon by Adeyemi and Ogunsola (2016) that used the Real Gross Domestic Product (RGDP) as the dependent variable to measure economic growth, and Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life expectancy Rate (LER), and Gross Capital Formation (GCF) as the independent variables to measure human capital formation. In addition, this model also includes; Employment Rate (EMPR). Therefore, the model for this study is specified below:

In implicit Form:

$$RGDP = f(PEE, PEH, TSE, LER, GCF, EMPR) \dots \dots \dots 1$$

In Explicit Form:

$$RGDP = a_0 + a_1PEE + a_2PEH + a_3TSE + a_4LER + a_5GCF + EMPR + \mu \dots \dots \dots 2$$

In Log-Linear Form:

$$\ln RGDP = a_0 + a_1 \ln PEE + a_2 \ln PEH + a_3 \ln TSE + a_4 \ln LER + a_5 \ln GCF + a_6 \ln EMPR + \mu \dots \dots \dots 3$$

Where;

RGDP = Real Gross Domestic Product

PEE = Public Expenditure on Education

PEH = Public Expenditure on Health

TSE = Total School Enrolment

LER = Life Expectancy Rate

GCF = Gross Capital Formation as a proxy for Stock of physical capital

EMPR = Employment Rate

$a_{1-7}$  = Parameters of the Model to be estimated

$\mu$  = Error Term

### A-priori Expectation

In the process of examining the relationship between human capital development and economic growth in Nigeria, it is important to note the expected signs of the parameters. The A priori expectation for the parameters in use includes:

Public Expenditure on Education (PEE)

The Apriori expectation will be positive (+) and it can be mathematically represented as:

$$\text{Public Expenditure on Education (PEE)} = \frac{\partial RGDP}{\partial PEE} > 0 \text{ (I.e. Positive Relationship)}$$

Public Expenditure on Health (PEH)

The Apriori expectation is positive (+) and it can be mathematically represented as:

$$\text{Public Expenditure on Health (PEH)} = \frac{\partial RGDP}{\partial PEH} > 0 \text{ (I.e. Positive Relationship)}$$

Total School Enrolment (TSE)

The A priori expectation is positive (+) and it can be mathematically represented as:

$$\text{Tertiary School Enrolment (TSE)} = \frac{\partial \text{RGDP}}{\partial \text{TSE}} > 0 \text{ (I.e. Positive Relationship)}$$

Life Expectancy Rate (LER)

The A priori expectation will be positive (+) and it can be mathematically represented as:

$$\text{Life Expectancy Rate (LER)} = \frac{\partial \text{RGDP}}{\partial \text{LER}} > 0 \text{ (I.e. Positive Relationship)}$$

Gross Capital Formation as a proxy for Stock of physical capital (GCF)

The A priori expectation will be positive (+) and it can be mathematically represented as:

$$\text{Gross Capital Formation (GCF)} = \frac{\partial \text{RGDP}}{\partial \text{GCF}} > 0 \text{ (I.e. Positive Relationship)}$$

Employment Rate (EMPR)

The A priori expectation will be positive (+) and it can be mathematically represented as:

$$\text{Employment Rate (EMPR)} = \frac{\partial \text{RGDP}}{\partial \text{EMPR}} > 0 \text{ (I.e. Positive Relationship)}$$

### **Description of Variables**

As stated in the model above, the dependent and independent variables used in the analysis of the impact of human capital formation and economic growth in Nigeria are explained below;

According to a number of studies, the Real Gross Domestic Product of a country can be used to measure the level economic growth of the country. This study is in line with Adeyemi and Ogunsola (2016) who employed the use of Real Gross Domestic Product as the dependent variable.

This research analysed the impact of human capital formation and economic growth in Nigeria. In line with the above, a number of independent variables have been identified as have been observed in past literature. They are given below:

According to UNICEF, Public spending on education includes direct expenditure on educational institutions as well as educational-related public subsidies given to households and administered by educational institutions. This indicator is shown as a percentage of GDP and of total public spending, divided by primary and tertiary levels. Public entities include ministries other than ministries of education, local and regional governments, and other public agencies.

According to UNICEF, Public expenditure on health refers to expenditure on health care incurred by public funds. Public funds are state, regional and local government bodies and social security schemes. Public capital formation in health includes publicly-financed investment in health facilities plus capital transfers to the private sector for hospital construction and equipment.

According to the United Nations, total school enrolment is an Education Index to determine the number of students enrolled at several different grade levels, and use it to show the ratio of the number of students who live in that country to those who qualify for the particular grade level.

Life expectancy is a statistical measure of the average time an organism is expected to live, based on the year of their birth, their current age and other demographic factors including sex. The most commonly used measure of life expectancy is at birth (LEB).

Statistically, it measures the value of acquisitions of new or existing fixed assets by the business sector, governments and "pure" households (excluding their unincorporated enterprises) fewer disposals of fixed

assets. GCF is a component of the expenditure on the gross domestic product (GDP), and thus shows something about how much of the new value added in the economy is invested rather than consumed.

Employment is a relationship between two parties, usually based on a contract where work is paid for, where one party, which may be a corporation, for profit, not-for-profit organization, co-operative or other entity is the employer and the other is the employee. Employees work in return for payment, which may be in the form of an hourly wage, by piecework or an annual salary, depending on the type of work an employee does and/or which sector she or he is working in.

### Techniques of Analysis

Analysis of data is a process of inspecting, cleansing, transforming, and modelling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. The method of data analysis adopted for this research work includes; Error Correction Model, Granger Causality Test and Fully modified ordinary least square. Before the test above commenced, some pre- estimation is needed to be tested for the direction of modelling. These pre-tests are discussed below:

Testing for a unit root is carried out by using Augmented Dickey-Fuller (ADF) test. This is the first step and the most important, in the literature, most time series variables are non-stationary and using non-stationary time series on another non-stationary time series in the model might lead to spurious regression Granger (1996). The first or second different terms of most variables will usually be stationary if it has constant mean value equilibrium, where there is a disequilibrium, as well as zero order of integration I (0). The ADF is conducted by adding the lagged values of the dependent variables with the independent variables in the regression. The most famous test is the one specified above and another test is the Phillips Peron test. Both use the existence of a unit-root as the null hypothesis. Consider a simple general AR (P) process given by

$$Y_t = u + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \dots + \phi_p Y_{t-p} + \varepsilon_t \dots \dots \dots 1$$

If this is the process generating the data but an AR (1) model is fitted, say

$$Y_t = u + \phi_1 Y_{t-1} + V_t \dots \dots \dots 2$$

$$\text{Then } V_t = \phi_1 Y_{t-1} + \dots + \phi_p Y_{t-p} + \varepsilon_t \dots \dots \dots 3$$

And the autocorrelation of  $V_t$  and  $V_{t-k}$  for  $K > 1$ , will be nonzero, because of the presence of the lagged  $Y$  terms. Thus an indication of whether it is appropriate to fit an AR (1) model can be aided by considering the autocorrelation of the residual from the fitted model. To illustrate how DF test can be extended to autogressive processes of order greater than 1, the research considers the simple AR (2) process below.

$$Y_t = u + \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \varepsilon_t \dots \dots \dots 4$$

Then note that this is the same as:

$$Y_t = u + (\phi_1 + \phi_2) Y_{t-1} - \phi_2 (Y_{t-1} - Y_{t-2}) + \varepsilon_t \dots \dots \dots 5$$

And subtracting  $Y_{t-1}$  from both sides gives

$$\Delta Y_t = u + \beta Y_{t-1} \delta_1 \Delta Y_{t-1} + \Delta \varepsilon_t \dots \dots \dots 6$$

Where

$$\beta = \phi_1 + \phi_2 - 1$$

$$\delta = -\phi_2$$

If the appropriate order of the AR process is 2 rather than 1, the term  $\Delta Y_{t-1}$  should be added to the regression model. A test of whether there is a unit root can be carried in the same way as the DF test, with the test statistics provided by 's' statistics of the  $\beta$  coefficient. If  $\beta = 0$  then there is unit root. The null hypothesis of non-stationarity is tested using the t-statistic with critical values calculated by Mackinnon (1996). The null hypothesis that the series is I (0) is rejected when the test statistic is more negative than the critical value and is significant in favor of the alternative hypothesis that the series is stationary.

We will employ the maximum likelihood test procedure suggested by Johansen and Juselius (1988, 1990). Specifically, if  $y_t$  is a vector of  $n$  stochastic variables, then there exists a  $p$ -lag vector auto-regression with Gaussian errors of the following form in which Johansen and Juselius's methodology takes its starting point in the vector autoregression (VAR) of order  $P$  given by:

$$y_t = \mu + \Delta 1y_{t-1} + \dots + \Delta p y_{t-p} + \epsilon_t$$

Where

$y_t$  is an  $n \times 1$  vector of variables that are integrated of order commonly denoted (1) and  $\epsilon_t$  is an  $n \times 1$  vector of innovations.

To determine the number of cointegration vectors, Johansen (1988) and Johansen and Juselius (1988, 1990) suggested a statistical test: the first one is the trace test ( $\lambda$  trace).

It tests the null hypothesis that the number of the distinct co-integrating vector is less than or equal to  $q$  against a general unrestricted alternatives  $q = r$ , this test is shown below.

$$\lambda \text{ trace } (r) = -T \sum_{i=r+1}^q \ln(1 - \lambda_i)$$

Where:

$T$  is the number of usable observations, and  $\lambda_i$ 's are the estimated Eigen value from the matrix. The second statistical test is the maximum Eigen value test ( $\lambda$  max) that is calculated according to the following formula.

$$\lambda \text{ max } (r, r + 1) = -T \ln(1 - \lambda_{r+1})$$

The test concerns a test of the null hypothesis that there is a co-integrating vector against the alternative of  $r + 1$  co-integrating vector.

Error Correction technique corrects for disequilibrium between short run and long-run behaviour of the dependent variable to its long-run value. The error correction model indicates the speed of the adjustment which restores equilibrium in the dynamic model. It shows how quickly variable return to equilibrium which must have a statistical significant coefficient.

The basis for the Johansen Co-integration test is to ascertain the existence of a long-run linear relationship among the economic variables. Conducting this test will enable a researcher to know whether to proceed on the Error Correction Mechanism or not. If variables are co-integrated, there would be a need for short-run dynamic model (ECM) and if not, the use of ECM will not be necessary.

The Granger causality test is a statistical hypothesis test for determining whether one-time series is useful in forecasting another. In this study, the test examines whether a past change in one variable  $x$  helps to attain the current changes in another variable  $y$  over and above the explanation provided by past changes in  $y$ .

The Granger causality test is used to determine if there is a direction of causality relationship between the dependent and the independent variable.

It is bi-variable if you want to see the impact of  $X$  on  $Y$  and  $Y$  on  $X$ :

$$Y = f(X) \dots \dots \dots 1$$

$$X = f(Y) \dots \dots \dots 2$$

It is possible that the past value of  $X$  has an influence on  $Y$  such that,

$$Y_t = f(X_{t-1}) \dots \dots \dots 3$$

If this happens then  $f(X_{t-1})$  is said to granger cause  $Y_t$ , this means the past value of  $X$  is predicting the present behavior of  $Y$ .

It can also be the other way round,

$$X_t = f(Y_{t-1}) \dots \dots \dots 4$$

Then it means that  $f(Y_{t-1})$  granger causes  $X_t$ , this means the past value of  $Y$  is predicting the present behavior of  $X$ . A bi-directional causality implies that there is a feedback between the two variables.

It may also be one-way causality when the past value of X Granger causes Y but Y does not Granger cause X, this can also be called a uni-directional causality;

$X_{t-1} \rightarrow Y_t$  . But  $Y_t \nrightarrow X_{t-1}$ , this means there is no feedback between the two variables.

## Findings

The variables used in this research work are Real Gross Domestic Product (RGDP), Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life Expectancy Rate (LER), Gross Capital Formation (GCF) and Employment Rate (EMPR).

The Augmented Dickey-Fuller Unit Root Test was used to test for the stationarity of each variable. The result of the Cointegration Test is reported next. The Johansen Cointegration Test was used in this research work, followed by the Error Correction Model. The Granger Causality Test was conducted to determine the direction of causality between the variables.

**Table 1:** Descriptive table

	RGDP	TSE	GCF	LER	PEE	PEH	EMPR
Mean	30746.47	172.2478	1.74E+10	44.04739	35245.94	48.30889	9.408333
Median	22391.14	179.0500	4.26E+09	43.58150	5244.755	4.315000	10.05000
Maximum	69023.93	225.6200	8.57E+10	47.41200	164960.9	257.7200	23.90000
Minimum	13779.26	81.68000	2.02E+09	40.31800	162.3700	0.040000	0.000000
Std. Dev.	17060.12	38.37648	2.47E+10	1.691797	52296.31	74.16311	6.119588
Skewness	0.957991	-1.034956	1.684795	0.192562	1.393645	1.598936	-0.039507
Kurtosis	2.585667	3.283024	4.252559	2.886079	3.569189	4.320231	2.923854
Jarque-Bera	5.763993	6.546952	19.38457	0.241947	12.13943	17.95409	0.018062
Probability	0.056023	0.037875	0.000062	0.886057	0.002312	0.000126	0.991010
Sum	1106873.	6200.920	6.27E+11	1585.706	1268854.	1739.120	338.7000
Sum Sq. Dev.	1.02E+10	51546.40	2.14E+22	100.1761	9.57E+10	192505.8	1310.728
Observations	36	36	36	36	36	36	36

Source: Authors' Result, 2019

The summary of the statistics used in this empirical study is presented in Table 1 below. As may be observed from the Table, Public Expenditure on Health (PEH), Life Expectancy Rate (LER), and Employment Rate (EMPR) has the lowest mean value of 48.31, 44.05 and 9.41 and the mean value of RGDP, Public Expenditure on Education (PEE) and Gross Capital Formation (GCF) have the highest mean value of 30746.47, 35245.94 and 174000 whereas the mean values of TSE are 172.25 respectively. The analysis was also fortified by the values of the skewness and kurtosis of all the variables involved in the models. The skewness is a measure of the symmetry of the histogram while the kurtosis is a measure of the tail shape of the histogram. The benchmark for symmetrical distribution i.e. for the skewness is how close the variable is to zero while in the case of kurtosis when it is three is called mesokurtic but values lower than that is called platykurtic and above is referred to as leptokurtic. The result of the Jarque-Bera also confirms the normality distribution assumption of the model.



**Table 2:** Correlation Matrix

	RGDP	PEH	PEE	LER	TSE	GCF	EMPR
RGDP	1.000000						
PEH	0.944919	1.000000					
PEE	0.360176	0.151206	1.000000				
LER	0.876259	0.864487	0.360666	1.000000			
TSE	0.248575	0.206292	0.308471	0.569504	1.000000		
GCF	0.877363	0.912413	0.004523	0.725213	0.028006	1.000000	
EMPR	0.542917	0.448372	0.592808	0.662581	0.713151	0.263433	1.000000

Source: Authors' Result, 2019

Table 2 presents the correlation coefficients of Real gross domestic product (RGDP), Gross capital formation (GCF), Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life Expectancy Rate (LER) and Employment Rate (EMPR). Here, we pay special attention to the correlation between the independent variables. Our results suggest that none of the independent was serially perfectly correlated with one another

**Table 3:** Result of the Unit Root Test (Stationarity Test)

VARIABLES	ADF STATISTICS VALUE AT LEVEL	ADF STATISTICS VALUE AT FIRST DIFFERENCE	CRITICAL VALUE	ORDER OF INTEGRATION
RGDP	-0.013258	-11.67923**	-2.951125	1 {1}
PEE	-1.477729	-6.794110**	-2.976263	1 {1}
PEH	-1.267286	-6.538776**	-2.951125	1 {1}
TSE	-2.731113	-3.503261**	-2.951125	1 {1}
LER	1.771021	-6.65843**	-2.960411	1 {1}
GCF	0.348646	-4.917753**	-2.951125	1 {1}
EMPR	-1.925195	-5.850150**	-2.951125	1 {1}

Source: Authors' Computation (2019)

Note: (\*\*) Denotes Rejection of Hypothesis at 5% Level of Significance

The result of the Augmented Dickey-Fuller (ADF) Unit Root is presented in Table 3 above. It indicates that all the variables are stationary at first difference at 5% level of significance. This shows that first differencing the series eliminates the non-stationarity components and the null hypotheses of non-stationarity are robustly rejected at conventional levels suggesting that all variables are integrated of order one, I(1). Thus, the precondition for cointegration is established since all variables are integrated of the same order.

Being multivariate function Johansen Methods of Cointegration is employed and the result is presented in Table 4. The results of the Johansen cointegration test based on the trace test and max-Engel test are shown in Table 4.4. The test determines whether or not there exists a long-run relationship among Real Gross Domestic Product (RGDP), Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life Expectancy Rate (LER), Gross Capital Formation (GCF) and Employment Rate (EMPR). We start with the null hypothesis of no cointegration and concluded on the existence of at least one (1) cointegrating vector if the null hypothesis is rejected.

**Table 4:** Johansen Cointegration Rank Test Result-Unrestricted Co-Integration Test (Model One)

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized	Trace	0.05	Max-Eigen	0.05
No. of CE(s)	Statistic	Critical Value	Statistic	Critical Value
None *	335.5798	125.6154	151.5980	46.23142
At most 1 *	183.9818	95.75366	81.08348	40.07757
At most 2	102.8984	69.81889	40.73386	33.87687
At most 3	62.16451	47.85613	29.75388	27.58434
At most 4	32.41063	29.79707	24.36383	21.13162
At most 5	8.046800	15.49471	7.456765	14.26460
At most 6	0.590035	3.841466	0.590035	3.841466

Source: Authors Result, 2019

Note: (\*\*) Denotes Rejection of the Hypothesis at 5% Level of Significance

The result of the Johansen Cointegration Test presented in Table 4 above indicates at least five cointegrating equation. The result confirms the existence of Cointegration among the variables. Consequently, we can conclude that there exists a long run relationship between Human Capital Formation and Economic Growth in Nigeria.

**Table 5:** Error Correction Model Estimation

Variables	Coefficient	Stand. Error	T-Statistics	P-Value
D(RGDP(-1))	0.259936	0.050527	5.144528***	0.0000
D(PEE(-1))	-0.006273	0.007177	-0.874154	0.3907
D(PEH(-1))	-51.40689	12.31475	-4.174417***	0.0003
D(TSE(-1))	-12.61166	13.08861	-0.963560	0.3449
D(LER(-1))	-754.9790	1122.193	-0.672771	0.5075
D(GCF(-1))	2.43E-07	4.20E-08	5.788540***	0.0000
D(EMPR(-1))	229.2627	64.64199	3.546653***	0.0016
C	1242.673	263.7392	4.711749***	0.0001
ECM	-0.010780	0.001831	-5.886962***	0.0000
R-Squared	0.766605			
Adjusted R-Squared	0.679082			
F-Statistics	8.758905***(0.0000)			
Durbin Watson	2.332744			

Source: Authors' Result, 2019

Note: \*, \*\*, & \*\*\* implies 10%, 5% & 1% significance level

The Error Correction Model result in Table 5 above shows that about 1.08% represents the speed at which the independent variables will adjust annually as warranted by the Error Correction Model value of -0.010780. The Error Correction Model suggests the validity of the equilibrium relationship. The coefficient of the Error

Correction Model which is -0.010780 confirms the negativity of the Error Correction Model and corresponding Probability Value of 0.0000 shows that the Error Correction Model is significant at 5% significance level.

According to the results obtained above, only PEE and LER is not significant and all other variables are significant. With exemption to GCF and EMPR which have a direct relationship with economic growth, all other variables have an inverse relationship with economic growth.

The value of the R-squared of 67.9 is an indication that only 67.9% variation in economic growth is explained by the independent variables i.e. Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life Expectancy Rate (LER), Gross Capital Formation (GCF) and Employment Rate (EMPR) and the remaining 32.1% not explained by the model is accounted for by other variables.

The F-test statistics which is the test of overall significance of the model indicates that by its P-value of 0.0000, it is significant at 5% level of significance. Therefore, it is confirmed that Human Capital Formation has a significant relationship with Economic Growth in Nigeria.

**Table 6:** The Effect of macroeconomic variables on the Balance of Payment in Nigeria

Dependent Variable: BOP				
Method: Fully Modified Least Squares (FMOLS)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PEE	0.071512	0.011010	6.495227***	0.0000
PEH	118.1220	20.85646	5.663566***	0.0000
TSE	-3.533175	22.24749	-0.158812	0.8750
LER	1359.055	966.8994	1.405581	0.1708
GCF	2.06E-07	4.36E-08	4.712513***	0.0001
EMPR	93.11235	123.3651	0.754771	0.4567
C	-41081.97	39162.43	-1.049015	0.3031
R-squared	0.977298	F-statistic		1223.821
Adjusted R-squared	0.972434	Chi-square		8566.750
Long-run variance	20.62163			

Source: Authors' Result, 2019

Table 6 presents the regression which was carried out to study the long run impact of the human capital formation on economic growth in Nigeria. The dependent variable "economic growth" was proxied by real gross domestic product (RGDP), why the dependent variable Gross capital formation (GCF) was accompanied by control variables like Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), Total School Enrolment (TSE), Life Expectancy Rate (LER) and Employment Rate (EMPR). The study employ fully modifies ordinary least square (FMOLS) to justify the co-integrating factors of the pre-estimation test. The result shows that all variables correspond to the theoretical exposition as all variables posit the exact signs expected except TSE which posits an inverse effect. PEE, PEH, LER, GCF and EMPR exact direct effect on economic growth while TSE posit an inverse effect on RGDP. The result also provides that a unit increase in PEE, PEH, LER, GCF and EMPR brings about 0.07, 118.12, 1359.06, 2-07 and 93.112 in RGDP respectively. While a unit increase in TSE brings about a decrease of 3.53 in RGDP respectively. The individual significant of the model shows that PEE, PEH and GCF are statistically significant to RGDP in Nigeria at 5 per cent significant level.

The result shows goodness of fit of 97.2 which indicates that the explanatory strength of the model is moderate. In broad terms, the PEE, PEH, TSE, LER, GCF and EMPR explained only 97.2 per cent variation in RGDP in Nigeria. The overall model was justified using wald-test. The result shows that the overall model is statistically significant at 5 % significant giving the F-statistic of 1223.821.

However, as part of the analysis, the research work accesses other forms of linear relationship that exist between Human Capital Formation and Economic Growth. On this note, the research work explores the Granger Causality between Economic Growth and the variables used to capture Human Capital Formation. The result of the Granger Causality Test is presented

**Table 7:** Result of the Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
PEE does not Granger Cause RGDP	34	6.27143	0.0055
RGDP does not Granger Cause PEE		2.39E-01	0.7893
PEH does not Granger Cause RGDP	34	6.33E+00	0.0052
RGDP does not Granger Cause PEH		1.51E-01	0.8606
TSE does not Granger Cause RGDP	34	0.1769	0.8388
RGDP does not Granger Cause TSE		1.00904	0.3770
LER does not Granger Cause RGDP	34	0.4457	0.6447
RGDP does not Granger Cause LER		34.9087	2.00E-08
GCF does not Granger Cause RGDP	34	9.68987	0.0006
RGDP does not Granger Cause GCF		6.61433	0.0043
EMPR does not Granger Cause RGDP	34	2.12188	0.1380
RGDP does not Granger Cause EMPR		0.64031	0.5344

Source: Author's Computation (2017)

The result of the causality test as shown in table 7 indicated that Human Capital Formation has a better impact on Economic Growth in Nigeria in the short run. The result indicates that a unidirectional causality exists between Real Gross Domestic Product (RGDP) and Total School Enrolment (TSE) and Real Gross Domestic Product (RGDP) and Employment Rate (EMPR). It also indicates that causality runs from Real Gross Domestic Product (RGDP) to Public Expenditure on Education (PEE), Real Gross Domestic Product (RDGP) to Public Expenditure on Health (PEH) and Life Expectancy Rate (LER) to Real Gross Domestic Product (RGDP). No causality was observed between Gross Fixed Capital Formulation (GCF) and Real Gross Domestic Product (RGDP).

Therefore, it is confirmed that Total School Enrolment (TSE), Employment Rate (EMPR) and Life Expectancy Rate (LER) can be used to influence Economic Growth in Nigeria at least in the short run. But other variables such as Public Expenditure on Education (PEE), Public Expenditure on Health (PEH), and Gross Fixed Capital Formulation (GCF) might not have any significant short-run relationship with economic growth in Nigeria.

## Conclusion

The aim of this study is to examine the relationship between Human Capital Formation and Economic Growth in Nigeria from 1980 to 2015. After the analysis, the following conclusions were drawn:

First, the result of the Augmented Dickey-Fuller (ADF) Unit Root Test indicated that all the variables were integrated at order one. This confirmed the existence of cointegration among the variables and consequently, the long run relationship between Human Capital Formation and Economic growth in Nigeria.

Second, the result of the Johansen Cointegration Test indicated at least four cointegrating equation. The result confirmed the existence of Cointegration among the variables. It concluded that there exists a long run relationship between Human Capital Formation and Economic Growth in Nigeria.

Third, according to the results obtained from the error correction model, only Gross Fixed Capital Formulation (GCF) was significant and all other variables were not significant. With exemption to Public Expenditure on Education (PEE) and Public Expenditure on Health (PEH), which had a direct relationship with economic growth, all other variables had an inverse relationship with economic growth. The F Test which is the test of overall significance of the model indicated that by its value of 0.000914, it is significant at 5% level of significance. Therefore, it is confirmed that Human Capital Formation has a significant relationship with Economic Growth in Nigeria.

Fourth, the result of the causality test showed that Human Capital Formation has a better impact on Economic Growth in Nigeria in the short run. The result indicated a unidirectional causality between Real Gross Domestic Product (RGDP) and Total School Enrollment (TSE) and Real Gross Domestic Product (RGDP) and Employment Rate (EMPR). It also indicated that causality runs from Real Gross Domestic Product (RGDP) to Public Expenditure on Education (PEE), Real Gross Domestic Product (RDGP) to Public Expenditure on Health (PEH) and Life Expectancy Rate (LER) to Real Gross Domestic Product (RGDP). No causality was observed between Gross Fixed Capital Formation (GCF) and Real Gross Domestic Product (RGDP).

Empirically, Gross Capital Formation (GCF) used as a proxy to measure Human Capital Formation had no directional causality with economic growth, but, it showed a positive relationship and significant relationship with economic growth.

Based on this empirical analysis, appropriate policies can be formulated and be implemented that would boost the positive impact of Human Capital Formation on economic growth and reduce the negative effects that may want to crop up over time as the economy grows.

From the findings, it is clear that there was a causal relationship between Human Capital Formation and Economic Growth, in terms of Total School Enrolment (TSE), Employment Rate (EMPR) and Life Expectancy Rate (LER).

Therefore, there should be:

- i) adequate funding and provision of a high standard of Education;
- ii) an improve the standard of education in Nigeria;
- iii) required level and reinvigorated innovation capacity that can assure the quality of total school enrolment in Nigeria such as primary, secondary and tertiary education.

## **References**

- Abramowitz, M. (1981). Welfare quandaries and productivity concerns. *The American Economic Review*, 71(7): 1-17.
- Adelakun, O J. (2011). Human capital development and economic growth in Nigeria. *Journals and books hosting – conferences & workshops solutions*. 3(9).
- Bloom, D. E., & Canning, D. (2003). "Longevity and life cycle saving". *Scandinavian journal of economies* 105(3): 318 – 38.
- Boldizzoni, F. (2008). *Means and ends. The idea of capital in the west; 1500 – 1970*, New York: Palgrave Macmillan.
- Granger, C. W. (1996). Development in the study of co-integrated economic variable. *Oxford Bulletin of Economic and Statistics*, 48(3): 213-228.
- Harbison, F. H. (1962). Human resources development planning in modernizing economies. *International labor review*, 453 – 458.

- Human Capital Index Report. (2009). Economic report for Africa. Retrieved April 18th, 2014 from <http://reports.weforum.org/human-capital-index-2009>.
- Human Resources Development in Africa (NES, 2002). Annual conference of the Nigerian Economic Society.
- Lucas, R. E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics*. Amsterdam: Elsevier Science B.V., 1988, 22(1), 3-42.
- Kathleen, L. (2012). Learning human capital development in the open. Retrieved May 21st, 2014 from <http://educationinthemiddleeast.wordpress.com>.
- Mahroum, S. (2007). "Assessing Human Resources for Science and Technology: The 3Ds Framework. *Science and Public Policy*. 34(7), 489 – 499.
- Mankiw, G., Romer, D., & Weil, D. (1992). A Contribution to the Empirics of Economic Growth. *Quarterly Journal of Economics* 107, pp 407-37
- Martinez, W. (2014). The true meaning of human capital. Retrieved May 21st, 2014 from [http://www.deloitte.com/view/en\\_GT/gt/press/3d5ea783aab60310VgnVCM2000001b56](http://www.deloitte.com/view/en_GT/gt/press/3d5ea783aab60310VgnVCM2000001b56).
- Ncube, M. (1999). Is human capital important for economic growth in Zimbabwe? *African Journal of economic policy*, 1-14.
- Olugbenga, T. A., & Azeez, B. A. (2014). Human capital development as correlate of Economic growth in Nigeria.
- Osekhebhen, G. E., & Anaduaka, U. S. (2014). Human capital development and economic growth. The Nigeria experience. *International journal of academic research in Business and Science* pp 25 – 25.
- Romer, C. I. (1986). "Increasing returns and long-run growth". *Journal of Political Economics*, 94, 1002- 1037.
- Nigerian Economic Society Annual Conference on "Human Resources Development in Africa". Ibadan: Department of Economics, (2002), 54 – 57.
- OECD – Organization for Economic Cooperation and Development. *The knowledge-based economy*. Paris: OECD, 1996.
- Oluwatobi, S. O., & Ogunrinola, I. O. (2011). Government expenditure on human capital development: implications for economic growth in Nigeria, *Journal of Sustainable Development* Vol. 4, No. 3.
- Organization for Economic Co-operation Development (2001). Paris: OECD. *Planning in Africa*. Addis Ababa. UNECA.
- Phillips, P.C.B., & Perron, P. (1988). Testing for a Unit Root in Time Series Regression,
- Schultz, T. P. (1961). "Investment in Human Capital" *American Economic Review*, 3, 1 – 17.
- Schultz, T. P. (1992). The role of education and human capital on economic development. An empirical assessment center discussion paper, economic growth center, Yale University.
- Theodore, R. B. (2012). The Role of Education in Economic Development: Theory, History, and Current Returns May 12.
- United Nations Development Programme. Summary: Human Development Report Nigeria. Abuja: UNDP, 2001.
- Woodhall, M. (2001). Human capital: educational aspects, *International Encyclopedia of the Social & Behavioral Sciences*.

© 2018. This work is published under NOCC (the “License”). Notwithstanding the ProQuest Terms and Conditions, you may use this content in accordance with the terms of the License.