

## The relationship between human capital investment in education and health, investment in electricity generation and economic growth in Nigeria.

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### ABSTRACT

The concept of investment in human capital is not so new and so recent in social and economic discuss. The classical and neoclassical economists point out that in the process of economic growth, more priority is accorded to the accumulation of physical capital (Jhingan, 2005). However, with the emergence of the new endogenous growth theories in the 1980s, the active role played by human capital in the growth of economies began to emerge. Human capital is the term economists often use for education, health, and other human capacities that can raise productivity when increased. Health and education are two closely related human capital components that work together to make the individual more productive. Inadequate funding is the major problem of human capital. The result of ADF unit root test conducted. Based on the difference between the absolute value of the ADF t-statistic and the 5% critical values, it is seen that Electricity Expenditure (EEXP), Human Capital Expenditure (HCXP), and Capital Stock (KS) are integrated at first difference while Labour Force (LF) and Real Gross National Product (RGNP) are stationary at levels. As a result of a mixture of  $I(0)$  and  $I(1)$  variables, the bounds test method of cointegration seems the best to use in explaining a long-run relationship among the variables. There is no causality relationship among human capital investment on health and education, investment on electricity generation and economic growth in Nigeria. The probability values for the coefficients of F-statistics for the pairs of hypotheses on human capital investment and expenditure on electricity (investment) are 0.8883, 0.5507, and 0.0827, 0.2593. Since their probability values are not less than 0.05, we do not reject the null hypothesis. Therefore, in conclusion there is no causality relationship among human capital investment on health and education, investment on electricity generation and economic growth in Nigeria.

Keywords: Health, Education, Investment, Electricity and Economic growth.

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### INTRODUCTION

The concept of investment in human capital is not so new and so recent in social and economic discuss. The classical and neoclassical economists point out that in the process of economic growth, more priority is accorded to the accumulation of physical capital [1]. However, with the emergence of the new endogenous growth theories in the 1980s, the active role played by human capital in the growth of economies began to emerge [2]. Human capital is the term economists often use for education, health, and other human capacities that can raise productivity when increased [3]. Health and education are two closely related human capital components that work together to make the individual more

productive [4]. Inadequate funding is the major problem of human capital. This has led to shortage of skilled personnel, unemployment and above all, poverty [5]. 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 [6]. It was recommended by the United Nations (UN) that developing countries should invest a minimum of 26% of annual budget on education and the World Health Organisation (WHO) specified at least 5% on health. Nigeria has not been able to meet this bench mark. In 2012, the

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education sector got a meager 8.4% of the budget while the health sector got about 6% [7]. The Human Development Index (HDI) has three indicators: income, life expectancy (proxy for health), and knowledge (proxy for education).

The trend of life expectancy in Nigeria has not followed a smooth and increasing pattern between 1982 and 2000. However, there was a gradual sharp increase between year 2001 and 2012 [8]. This began to drop around year 2013 up till 2015. Factors like ravaging diseases, hunger and insecurity in the land may be said to have accounted for this [9]. On the other hand, it is imperative to note that stable power supply is inevitable and is needed to support development of any economy be it developing countries or developed countries of the world [10]. The world economies are heavily reliant on electricity and Nigeria is not an exception [11]

Electricity supply is a prerequisite for a nation to move from a third world country to a developed country; for a developing country like Nigeria, the greater the stability of electricity supply, the better its chances to become more developed [10]. With adequate utilization of electric power supply, there will be higher potentials for Nigeria to meet the demand for industrial development. The nation would experience high levels of economic activities through industrialization and high rate of capacity utilization.

[5] opines that electricity efficiency is the indispensable component of any effort to improve productivity and of course, contributes to economic wealth. Majority of Nigerians are dependent on fossil fuel and fuel wood (firewood). The over dependence on fossils and fuel wood (used mainly by poor rural dwellers) have

#### Statement of the Problem

Nigeria is a developing economy whose Gross Domestic Product (GDP) has been growing over the past decades except for recently in 2016 when the economy slipped into recession apart from early 1980s. However, this increasing GDP has not been translated into improvement in the quality of lives of its citizens. The

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not yielded enough capacity to meet increasing demands for energy in the real sectors such as the manufacturing, industrial sector, mining and quarrying, etc, which relies much on electricity for efficiency to be recorded. It should be noted that one of the pre-requisites of real sector development is adequate supply of electricity [6]. The electricity crisis is represented by such indicators as electricity blackouts, transformer explosions and persistence reliance on self-generating electricity.

Nigeria's persistent electricity crises have weakened the industrialization process, resulting to production stoppages, shutdown and high operational cost, and significantly undermined the efforts of government of Nigeria to achieve sustained economic growth and development. The pre-requisite of manufacturing productivity is adequate supply of electricity which is mainly utilized for driving machines for the production of various items [6]. Manufacturing sector is one which comprises agglomeration of industries engaged in chemical, mechanical, or physical transformation of materials, substances, or components into consumer or industrial goods [7]. This sector needs deliberate and sustained application and combination of an appropriate technology, infrastructure, managerial expertise, and other important resources to produce manufacturing goods (semi-finished or finished goods), the technology and infrastructure needed cannot be achieved without stable power supply of which electricity takes a prominent role. In the light of the foregoing, this study examines the impact of investments in human capital and electricity on economic growth in Nigerian [6].

government, in its annual budget, claims to spend huge amount of money in providing education, health and training for the citizens. Progress in education, healthcare and training has been shown to be not too encouraging in Nigeria. This bad scenario is manifested in the increasing level of poverty,

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unemployment, low life expectancy, high  
infant mortality rate and poor

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performance of other welfare indices.

#### Research Questions

What is the causality relationship between  
human capital investment, investment on

electricity generation and economic  
growth in Nigeria?

#### Objectives of the Study

To ascertain the causality relationship  
between human capital investment in  
education and health, investment in

electricity generation and economic  
growth in Nigeria.

#### Hypothesis of the Study

Ho<sub>1</sub>: There is no causality relationship  
between human capital investment in  
health and education investment in

electricity generation and economic  
growth in Nigeria.

### METHODOLOGY

#### Research Design

The study adopted Ex-Post Facto research  
design as it facilitated the use of time  
series data and adopted various  
econometric analyses to obtain data-  
driven and evidence-based findings for  
the study. The Augmented Dickey-Fuller  
(ADF) unit root test and Bound test  
cointegration are used to test for  
stationarity and long run relationship  
among the time series variables  
respectively. The Auto-Regressive  
Distributed Lagged (ARDL) model and  
Engle Granger models are used in testing

the hypothesis. The research is designed  
to determine the impact of investments in  
human capital and electricity on  
economic growth in Nigeria from 1981-  
2017. Three models are formulated using  
proxies of Human Capital Development  
and Electricity variables as independent  
and Real GNP as dependent variables to  
test their impact on economic growth for  
the first two models and then Granger  
Causality to test the causality  
relationships amongst the variables for  
the third model.

#### Theoretical Framework

The framework of the study is based on  
the Cobb-Douglas production function.  
The Cobb-Douglas functional form of  
production is widely used to represent  
the relationship of an output to inputs.  
They considered a simplified view of the

economy in which production output is  
determined by the amount of labour  
involved and amount of capital invested  
production function of Cobb-Douglas  
used to model production was of the  
form:

$$P(L,K) = bL^{\alpha}K^{\beta}$$

Where;

- P = total production (the monetary value  
of all goods produced in a year),
- L = labour input (the total number of  
person-hours worked in a year),
- K = capital input (the monetary worth of  
all machinery, equipment, and buildings),
- b = total factor productivity or  
technology,

- $\alpha$  and  $\beta$  are the output elasticities of  
labour and capital, respectively. These  
values are constants determined by  
available technology. The notation,  $\alpha$ ,  
may be used interchangeably as  $1 - \beta$ .

### PRESENTATION AND ANALYSIS OF RESULTS

The variables of interest were subjected  
to unit root test in order to ensure  
stationarity of the series. The unit root

method adopted is Augmented Dickey-  
Fuller (ADF) unit root test.

Table 1: Result of ADF unit root test of the variables

Variables	Level form		First difference		Decision on Stationarity
	ADF t-statistic	5% critical value	ADF t-statistic	5% critical value	
<b>RGNP</b>	-3.347336	-2.945842	-	-	I(0)
<b>KS</b>	-2.058747	-2.951125	-10.43888	-2.951125	I(1)
<b>LF</b>	-6.773797	-2.945842	-	-	I(0)
<b>HCXP</b>	0.721426	-2.945842	-6.208766	-2.948404	I(1)
<b>EEXP</b>	-0.683430	-2.951125	-9.109653	-2.951125	I(1)

Source: Eviews 9 Output for the Result of ADF unit root test of the variables

Table 1: shows the result of ADF unit root test conducted. Based on the difference between the absolute value of the ADF t-statistic and the 5% critical values, it is seen that Electricity Expenditure (EEXP), Human Capital Expenditure (HCXP), and Capital Stock (KS) are integrated at first difference while Labour Force (LF) and

Real Gross National Product (RGNP) are stationary at levels. As a result of a mixture of I(0) and I(1) variables, the bounds test method of cointegration seems the best to use in explaining a long-run relationship among the variables.

#### Model for Objective

To determine causality relationship between human capital expenditure, electricity expenditure and economic growth in Nigeria): The Granger causality analysis technique was used to test the existence of causality relationship among the variables in the model. The Granger causality technique follows F-distribution.

The null hypothesis of no causality relationship is rejected when the probability of the F-statistic lies below 0.05. The result of Granger Causality analysis estimation is given in Table 2.

From table 2 below, no causality relationship exists between the following pair of variables in the model:

KS versus RGNP: KS  $\longrightarrow$  RGNP

RGNP versus KS: RGNP  $\longrightarrow$  KS

LF versus RGNP: LF  $\longrightarrow$  RGNP

RGNP versus LF: RGNP  $\longrightarrow$  LF

HCXP versus RGNP: HCXP  $\longrightarrow$  RGNP

RGNP versus HCXP: RGNP  $\longrightarrow$  HCXP

EEXP versus RGNP: EEXP  $\longrightarrow$  RGNP

RGNP versus EEXP: RGNP  $\longrightarrow$  EEXP

Table 2: Result of Granger Causality Analysis

<b>Pairwise Granger Causality Tests</b>			
<b>Null Hypothesis:</b>	<b>Obs</b>	<b>F-Statistic</b>	<b>Prob.</b>
<b>KS does not Granger Cause RGNP</b>	35	0.13587	0.8735
<b>RGNP does not Granger Cause KS</b>		1.45769	0.2488
<b>LF does not Granger Cause RGNP</b>	35	0.09258	0.9118
<b>RGNP does not Granger Cause LF</b>		1.12497	0.3380
<b>HCXP does not Granger Cause RGNP</b>	35	0.11888	0.8883
<b>RGNP does not Granger Cause HCXP</b>		0.60858	0.5507
<b>EEXP does not Granger Cause RGNP</b>	35	2.71131	0.0827
<b>RGNP does not Granger Cause EEXP</b>		1.41226	0.2593

#### Evaluation of Research Hypotheses

Hypothesis 3 ( $H_{03}$ ): There is no causality relationship among human capital investment on health and education, investment on electricity generation and economic growth in Nigeria.

Conclusion: From Table 2, the probability values for the coefficients of F-statistics for the pairs of hypotheses on human capital investment and expenditure on electricity (investment) are 0.8883,

0.5507, and 0.0827, 0.2593. Since their probability values are not less than 0.05, we do not reject the null hypothesis. Therefore, we conclude that there is no causality relationship among human capital investment on health and education, investment on electricity generation and economic growth in Nigeria.

#### DISCUSSION OF THE RESULTS

In view of the forgoing results of the data investigation done in this study, there is a need to align or misalign the findings in this study with previous studies done in this area. From the study, it is found that investment in human capital does not have significant impact on economic growth in the long-run. Also, investment in human capital does not have significant impact on economic growth in the short-run. This present finding is similar to [7] which finds a long run relationship between expenditure on human capital and economic growth, but just like this present study, the relationship between capital stock, public expenditure and economic growth is statistically insignificant. One difference between this present study and [6] is the use of only expenditure on education as proxy for human capital investment. Also, in support of the present finding is [9] which shows an insignificant relationship between public expenditure on education and health, life expectancy on economic growth. Another study that concurs with the present findings include [4]. However, the studies by [5, 8, 9, 11] indicate that human capital development has a significant impact on Nigeria's economic growth. The result of the data evaluation

of the second hypothesis reveals that investment in electricity does not have significant impact on economic growth in the long-run. In addition, investment in electricity is positively related, but does not have significant impact on economic growth in the short-run. This is in line with [3] who discover that electricity expenditure is positively related to GDP Per capita in the short-run. As a group [10], human capital was found to be positive and statistically significant to economic growth. The infrastructure variable (electricity) is positive but statistically insignificant. This result is not entirely surprising considering the unreliable, epileptic, unstable supply of energy and incessant power holidays in Nigeria. There is no causality relationship among human capital investment on health and education, investment in electricity generation and economic growth in Nigeria. In support of the present finding is the study by [11] pairwise estimate reveal no causality relationship between human capital development and economic growth. Conversely, in [2] also, the study shows an evidence of bi-directional causal relationship between electricity consumption and economic growth. Fairly,

[6] show that there is uni-directional causality from real GDP to electricity

consumption without a feedback effect.

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### Summary of Findings

There is no causality relationship between human capital investment on health and education ( $p(F) = 0.8883$ ,

0.5507), investment on electricity generation ( $p(F) = 0.8827$ , 0.2593) and economic growth in Nigeria.

#### CONCLUSION

From the days of Adam Smith, economic theories have always emphasized the role of investment as a determinant of economic growth. What has preoccupied the minds of economists all over the world is the identification of those unique and specific factors that account for growth, not only in developed, but developing and third world countries. Investments in human capital and infrastructure have been identified as factors that account for economic growth in many studies. Unlike previous studies that merely focused on the use of electricity consumption to account for economic growth, this study hypothesizes

that investment on human capital and investment on electricity are assumed to be the engine drivers of the Nigeria economy. After an extensive review of related literature in this area of study, the Autoregressive Distributed Lagged (ARDL) model was adopted as the technique for data analysis after the preliminary tests to ascertain the nature of the time series variables used for data analysis. Sequel to the findings from this study, it is concluded that: There was no causality relationship between investment in human capital, electricity generation and economic growth over the period under study.

#### RECOMMENDATIONS

In view of the findings in this study, the researcher makes the following recommendations: There should be appropriate collaboration among government institutions and stakeholders in the education and energy sectors to ensure and enhance monitoring,

regulation and review of investments in human capital and infrastructure by government. This will aid policy-makers to ensure appropriate synchronization and alignment of policies that would enhance their impact on economic growth.

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