CHAPTER ONE

HUMAN RESOURCE DEVELOPMENT AND ECONOMIC GROWTH IN NIGERIA: THE MISSING LINK

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Abstract
This study investigates the missing link between human resources development and economic growth in Nigeria. This study used the Granger causality test to examine the relationship among economic growth, labor productivity, and human capital development. At the same time, the SVAR, impulse response, and variance decomposition estimates traced the instantaneous effects and the transmission mechanism of human capital development to economic growth in Nigeria through labor productivity. The result shows that investment in human capital development has a long-run influence on economic growth. Nigeria's human capital expenditure on education and health had a weak effect on labor productivity. The Nigerian government should improve the allocation to the development of human capital in terms of improved education and health.

Keywords: Economic growth, human resource development, and labor productivity

Introduction

Nigeria is a country with a population of over 200 million people, vast arable land, and a favorable climate that is conducive to the production of goods and services. The country has benefited from the World Bank debt forgiveness, and it was the highest recipient of foreign direct investment in Sub-Saharan Africa in early 2000. Unfortunately, this has not transformed the country into industrialization. Instead, the country has experienced high unemployment, a decline in domestic production of goods and services, increases in debt and serving, and a drastic decline in foreign reserves. Regarding poverty measures, as provided by the World Bank Report (2022), about 33% of her population lived in abject poverty. Some identifiable causes are sluggish growth, low human capital development, labor market weaknesses, and shock exposure. With debt forgiveness in 2004, the economy is supposed to boost its production of goods and services. However, the economy is still plunged into more debt without a corresponding increase in domestic production of goods and services, as exemplified by the massive importation of goods and services.

The growth of the Nigerian economy is hinged on human resources development, labor productivity, the inflow of FDI, and population growth, to mention a few. The sustained increases in human resources propelling economic growth and development have long been recognized as a major driver of the nation's economy. Human resources can be seen as increasing the workforce's capabilities, skills, and knowledge that can work in various fields (Scientific World 2021). Human Resource Development function includes, among others, training and development, organizational development, career development, strategic management, and human resource development (DeSimone, 1998). Recognizing the importance of human resources, the Nigerian government has evolved policies and programs that will fine-tune and establish formal and informal educational systems. The establishment of more tertiary educational institutions is a case in point.

Both human resources and labor productivity play a major role in a nation's economic development. Labor productivity can be enhanced through a nation's physical capital and human and technological innovation. A nation can experience economic growth when there is a sustained increase in labor productivity. These increases translate into high employment, high consumption, and a high standard of living. This means a country that relies less on importing goods and services and increasing its exports will experience an increase in foreign exchange (foreign capital) and economic growth and development.

Various studies have looked at the direct impact of human resources on economic growth (Ogunleye-Adetona, 2010; Adelakun, 2011; Torruam & Abur, 2014; Olusanya, 2016; Awolusi, 2019; Keji, 2021) and many others while (Zulu & Banda, 2015; Grassetti, Mammana, & Michetti, 2018) looked at labor productivity and economic growth. This study did not replicate these studies. This study argued that human resource development does not directly impact economic growth. This is because training and development in several fields must impact the domestic economy through the effort or productivity of labor. In other words, the development of human resources is a necessary but not a sufficient condition if it does not impact labor. The impact on labor is expected to increase economic growth and development. For human resources to impact economic growth, it must pass through labor effort. This study becomes expedient to ascertain the transmission mechanism or a pass-through process between human resource development, labor productivity, and economic growth in Nigeria.

Empirical Literature

Wilson & Briscoe (2004), in the study of human capital and economic growth in Europe, found that the correlation between government expenditure on education and training is positive and significant in economic growth. This finding was drawn from a review of an in-depth appraisal of a vast body of international research that examines the links between education and training in a country and its macroeconomic growth. Oketch (2006) used two-stage least squares regression and found that human capital development has significantly impacted physical capital, transcending economic growth in Nigeria.

Jajril and Ismail (2010) examined labor quality and productivity in the Malaysian economy. Employing the Cobb-Douglas production function, the study incorporated modifications using the endogenous growth model advocated by Lucas and Roma. The research outcomes disclosed that capital stock and the capital-labor ratio are pivotal determinants influencing economic growth in Malaysia. Additionally, the study observed that physical labor plays a more substantial role than affected labor in shaping the trajectory of economic expansion. In a parallel investigation, Ogunleye-Adetona (2010) utilized descriptive statistics to explore the relationship between human resource development and economic growth in Nigeria. The findings from this study suggested that an escalation in the fertility rate hinders both human resource development and overall economic growth in Nigeria. In a separate study, Adelakun (2011) employed ordinary least squares regression to scrutinize the interplay between human capital development and economic growth in Nigeria from 1985 to 2009. The research unveiled a noteworthy discovery, indicating that human capital development exerts a substantial and positive influence on economic growth in Nigeria.

A study carried out by Torruam and Abur (2014) using Granger causality to ascertain the relationship between human capital development and economic growth in Nigeria showed that a bidirectional relationship ran from economic growth to human capital development and from total government expenditure to health. Zulu and Banda (2015) used the modified Cobb Douglass production function and the polled regression analysis to estimate the impact of labor productivity on economic growth. They observed that investment in physical capital significantly positively affects labor productivity and economic growth in Mauritius and South Africa. Regarding the fiscal impact on human resource development, Udoh, Afangideh, and Udeaja (2015) used the ARDL/Bunds test and discovered that fiscal decentralization has a negative effect on human resource development in Nigeria. Hadir & Lahrech (2015), using ordinary least squares regression, show that human capital contributes significantly to economic growth and development in Morocco.

Olusanya (2016) used ordinary least squares regression analysis and the Granger causality test to ascertain the effect of government expenditure on economic growth in Nigeria. The result from the ordinary least squares regression shows that government expenditure on education has a negative effect on economic growth in Nigeria. The Granger causality test shows no causality between the two variables in the study. Oru and Kalu (2016) used a unit root test and Error correction model to ascertain the effect of human resources on economic growth in Nigeria. The study revealed that physical capital has more impact on economic growth than non-physical capital. The result from the study conducted by Odo, Eze, and Onyeisi (2016) used VECM and shows that human capital development significantly affects economic growth in Nigeria.

Akaakohol and Ijirshar (2018) delved into the evaluation of the impact of human capital development on economic progress in Nigeria from 1981 to 2015. The study explored the dynamics at play by employing a comprehensive analytical approach, including the Johansen co-integration test, vector error correction test, and impulse response/variance decomposition. The Augmented Dickey-Fuller test, Johansen co-integration test, error correction test, and impulse response/variance decomposition collectively indicated a bidirectional relationship between economic growth and government expenditure on health, as well as between economic growth and government expenditure on education.

In a separate exploration, Grassetti, Mammana, and Michetti (2018) utilized a sigmoidal production function with a single variable input to examine the connection between labor productivity and economic growth. The research extended its analysis to incorporate Solow's growth model, concluding that labor productivity significantly influences economic growth. Turning to Nigeria, the study by Okowa and Vincent (2019) on human capital development and labor productivity employed the ARDL model. The research uncovered a cyclic relationship between human capital development and labor productivity by distinguishing education into primary, secondary, and tertiary levels. In macroeconomic performance studies, Maku, Ajike, and Chinedu (2019) utilized an autoregressive distributed lagged model to showcase that human resources development exhibits a negative and insignificant effect on economic growth in Nigeria. Conversely, the study highlighted a positive correlation between tertiary education enrollment and economic growth.

Abel, Mhaka, and Roux (2019) examined the interplay between human resource development and economic growth in Zimbabwe. Employing a multifaceted approach that included co-integration, error correction, and the Granger causality test, the study aimed to unravel the intricacies of this relationship. The results unveiled a noteworthy pattern: Government expenditure on health significantly and positively impacted economic growth. In contrast, government expenditure on education negatively affected economic growth. Shifting the focus to a global perspective, Awolusi (2019) explored the influence of human resources on economic growth across the BRICS countries, namely Brazil, Russia, India, China, and South Africa. Employing ordinary least squares regression and the generalized method of moments (GMM), the research revealed a substantial impact of human resources on economic growth in these nations. For a more nuanced understanding, the study employed ANOVA and Scheffe Pairwise comparison tests, discerning that China, Brazil, and Russia exhibited higher human resource development than countries such as India and South Africa.

Saleh, Surya, Ahmad, and Manda (2020) employed a multifaceted approach, utilizing observation, survey, and documentation, to investigate the impact of natural resources on human resources and economic growth in Bulukumba Regency, South Sulawesi Province, Indonesia. Their findings suggested that human resources could contribute to economic growth when optimizing natural resources is prioritized. In a parallel study, Agrawal and Khan (2020) utilized Ordinary Least Squares regression to explore the relationship between human resources development and economic growth in the Indian economy. The results indicated human resources development's significant and positive effect on economic growth.

Keji (2021) delved into the relationship between human capital and economic growth in Nigeria, spanning from 1981 to 2017. Employing the VAR model and the Johansson co-integration test, the study uncovered that human resource development has a long-term and noteworthy impact on economic growth in Nigeria. Moving to Indonesia, Widarni and Bawono (2021) utilized the Autoregressive Distributed Lag model to investigate the relationship between human capital development, technology, and economic growth. Their findings underscored the significant influence of both human capital and technology on economic growth. However, the study acknowledged a gap in establishing a direct link between human capital and economic growth. Consequently, the researchers are exploring further to unravel the connection between human resource development and economic growth, specifically through the lens of labor productivity in Nigeria.

Methodology

This study used econometric techniques. These include the Granger causality test, which was used to examine the relationship among economic growth, labor productivity, and human capital development, while the SVAR, impulse response, and variance decomposition estimates traced the instantaneous effects and the transmission mechanism of human capital development to economic growth in Nigeria through labor productivity. The time series properties of the variables were examined using the Augmented Dickey-Fuller (ADF) unit root test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test results.

3.1 Model Specification

Following the Solow-Swan growth model developed by Solow (1956) and Swan (1956) using the Cobb–Douglas production function, the growth model in this study can be expressed as:

$$Y = f(K^{\alpha} AL^{\beta}) \quad (1)$$

where Y = total output, K = capital accumulation or composition, L = labor or population growth, $0 < \alpha < 1$ is the elasticity of output concerning capital, and A refers to labor augmenting technology or knowledge. However, Mankiw, Romer, and Weil (1992) created a human capital-augmented version of the Solow-Swan model, which can be stated as:

$$Y = f(K^{\alpha} H^{\beta} AL^{1-\alpha-\beta}) \tag{2}$$

where H is the stock of human capital. Therefore, transforming the equation by taking the natural logarithm can be restated as:

$$\ln Y = f(\alpha \ln K, \beta \ln H, A(1-\alpha-\beta)\ln L) \tag{3}$$

Thus, the study followed the Mankiw, Romer, and Weil (1992) augmented version of the Solow-Swan model. Since the development of human capital embraces the use of capital, government expenditure on education and health proxies' human capital development, while labor productivity represents effective labor and real gross domestic product (RGDP) represents total output (Y), equation (3) can be restated as:

$$\ln RGDP = f(\alpha \ln LP, \beta \ln HCD) \tag{4}$$

Given the marginal efficiency of capital, a change in human capital development is expected to transform labor productivity, thereby leading to a multiplier effect of economic growth. Symbolically;

$$\uparrow HCD = \uparrow LP = \uparrow RGDP \tag{5}$$

where HCD human capital development, LP labor productivity, and $RGDP$ real gross domestic product are. This study used two proxies for human capital development in order to examine the robustness of the estimates. These include human development index (HDI) and government expenditure on education and health (EXPHE). Based on equation (5), the schematic form of the human capital development transmission to economic growth through labor productivity can be presented as:

$$HDI \Rightarrow \ln LP \Rightarrow \ln RGDP \tag{6}$$

$$\ln EXPHE \Rightarrow \ln LP \Rightarrow \ln RGDP \tag{7}$$

Assuming (p) as the optimal lag length, the SVAR in the reduced form of matrix notation to capture the contemporaneous effect can be expressed as:

$$A_0 Y_t = +A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + A_3 Y_{t-3} + ... + A_p Y_{t-p} + u_t \tag{8}$$

where A_0 is a matrix of contemporaneous coefficients and $A_1,\ldots,A_p$ is a matrix of lagged variable coefficients. The structural representation of the schematic model in equation (6) can be stated as:

$$\ln RGDP_t = \theta_{11}^1 \ln RGDP_{t-1} + \theta_{12}^1 \ln LP_{t-1} + \theta_{13}^1 HDI_{t-1} + \theta_{11}^2 RGDP_{t-2} + \theta_{12}^2 \ln LP_{t-2} + \theta_{13}^2 HDI_{t-2} + \ldots + \\ +\theta_{11}^p RGDP_{t-p} + \theta_{12}^p \ln LP_{t-p} + \theta_{13}^p HDI_{t-p} + \theta_{12}^0 \ln LP_t + \theta_{13}^0 HDI_t + u_{1t} \quad (9)$$

$$\ln LP_t = \theta_{21}^1 \ln RGDP_{t-1} + \theta_{22}^1 \ln LP_{t-1} + \theta_{23}^1 HDI_{t-1} + \theta_{21}^2 RGDP_{t-2} + \theta_{22}^2 \ln LP_{t-2} + \theta_{13}^2 HDI_{t-2} + \ldots + \\ +\theta_{21}^p RGDP_{t-p} + \theta_{22}^p \ln LP_{t-p} + \theta_{23}^p HDI_{t-p} + \theta_{21}^0 \ln RGDP_t + \theta_{23}^0 HDI_t + u_{2t} \quad (10)$$

$$HDI_t = \theta_{31}^1 \ln RGDP_{t-1} + \theta_{32}^1 \ln LP_{t-1} + \theta_{33}^1 HDI_{t-1} + \theta_{31}^2 RGDP_{t-2} + \theta_{32}^2 \ln LP_{t-2} + \theta_{33}^2 HDI_{t-2} + \ldots + \\ +\theta_{31}^p RGDP_{t-p} + \theta_{32}^p \ln LP_{t-p} + \theta_{33}^p HDI_{t-p} + \theta_{31}^0 \ln RGDP_t + \theta_{33}^0 \ln LP_t + u_{3t} \quad (11)$$

Similarly, the structural representation of the schematic model in equation (7) can be stated as:

$$\ln RGDP_t = \theta_{11}^1 \ln RGDP_{t-1} + \theta_{12}^1 \ln LP_{t-1} + \theta_{13}^1 \ln EXPHE_{t-1} + \theta_{11}^2 RGDP_{t-2} + \theta_{12}^2 \ln LP_{t-2} + \theta_{13}^2 \ln EXPHE_{t-2} + \ldots + \\ +\theta_{11}^p RGDP_{t-p} + \theta_{12}^p \ln LP_{t-p} + \theta_{13}^p \ln EXPHE_{t-p} + \theta_{12}^0 \ln LP_t + \theta_{13}^0 \ln EXPHE_t + u_{1t} \quad (12)$$

$$\ln LP_t = \theta_{21}^1 \ln RGDP_{t-1} + \theta_{22}^1 \ln LP_{t-1} + \theta_{23}^1 \ln EXPHE_{t-1} + \theta_{21}^2 RGDP_{t-2} + \theta_{22}^2 \ln LP_{t-2} + \theta_{13}^2 \ln EXPHE_{t-2} + \ldots + \\ +\theta_{21}^p RGDP_{t-p} + \theta_{22}^p \ln LP_{t-p} + \theta_{23}^p \ln EXPHE_{t-p} + \theta_{21}^0 \ln RGDP_t + \theta_{23}^0 \ln EXPHE_t + u_{2t} \quad (13)$$

$$\ln EXPHE_t = \theta_{31}^1 \ln RGDP_{t-1} + \theta_{32}^1 \ln LP_{t-1} + \theta_{33}^1 \ln EXPHE_{t-1} + \theta_{31}^2 RGDP_{t-2} + \theta_{32}^2 \ln LP_{t-2} + \theta_{33}^2 \ln EXPHE_{t-2} + \ldots + \\ +\theta_{31}^p RGDP_{t-p} + \theta_{32}^p \ln LP_{t-p} + \theta_{33}^p \ln EXPHE_{t-p} + \theta_{31}^0 \ln RGDP_t + \theta_{33}^0 \ln LP_t + u_{3t} \quad (14)$$

The matric form of the above recursive models can be expressed in matrix form as:

$$\begin{Bmatrix} 1 & -\theta_{12}^0 & -\theta_{13}^0 \\ -\theta_{21}^0 & 1 & -\theta_{23}^0 \\ -\theta_{31}^0 & -\theta_{32}^0 & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ HDI_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^1 & \theta_{12}^1 & \theta_{13}^1 \\ \theta_{21}^1 & \theta_{22}^1 & \theta_{23}^1 \\ \theta_{31}^1 & \theta_{32}^1 & \theta_{33}^1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ HDI_{t-1} \end{Bmatrix} \quad (15)$$

$$\begin{Bmatrix} \theta_{11}^2 & \theta_{12}^2 & \theta_{13}^2 \\ \theta_{21}^2 & \theta_{22}^2 & \theta_{23}^2 \\ \theta_{31}^2 & \theta_{32}^2 & \theta_{33}^2 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ HDI_{t-2} \end{Bmatrix} + \ldots + \begin{Bmatrix} \theta_{11}^p & \theta_{12}^p & \theta_{13}^p \\ \theta_{21}^p & \theta_{22}^p & \theta_{23}^p \\ \theta_{31}^p & \theta_{32}^p & \theta_{33}^p \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-p} \\ \ln LP_{t-p} \\ HDI_{t-p} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix}$$

$$\begin{Bmatrix} 1 & -\theta_{12}^{0} & -\theta_{13}^{0} \\ -\theta_{21}^{0} & 1 & -\theta_{23}^{0} \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ \ln EXPHE_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^{1} & \theta_{12}^{1} & \theta_{13}^{1} \\ \theta_{21}^{1} & \theta_{22}^{1} & \theta_{23}^{1} \\ \theta_{31}^{1} & \theta_{32}^{1} & \theta_{33}^{1} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ \ln EXPHE_{t-1} \end{Bmatrix} \tag{16}$$

$$\begin{Bmatrix} \theta_{11}^{2} & \theta_{12}^{2} & \theta_{13}^{2} \\ \theta_{21}^{2} & \theta_{22}^{2} & \theta_{23}^{2} \\ \theta_{31}^{2} & \theta_{32}^{2} & \theta_{33}^{2} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ \ln EXPHE_{t-2} \end{Bmatrix} + \ldots + \begin{Bmatrix} \theta_{11}^{p} & \theta_{12}^{p} & \theta_{13}^{p} \\ \theta_{21}^{p} & \theta_{22}^{p} & \theta_{23}^{p} \\ \theta_{31}^{p} & \theta_{32}^{p} & \theta_{33}^{p} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-p} \\ \ln LP_{t-p} \\ \ln EXPHE_{t-p} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix}$$

The SVAR is recursive, where the K variables are assumed to form a recursive dynamic structural model where each variable only depends upon those above it in the vector Y_t. Following this approach, we can restrict the upper elements above the matrix diagonal to zero. That is, $\theta_{12}^{0} = \theta_{13}^{0} = \theta_{23}^{0} = 0$. Thus, the restricting parameters in A_0 yields:

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ HDI_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^{1} & \theta_{12}^{1} & \theta_{13}^{1} \\ \theta_{21}^{1} & \theta_{22}^{1} & \theta_{23}^{1} \\ \theta_{31}^{1} & \theta_{32}^{1} & \theta_{33}^{1} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ HDI_{t-1} \end{Bmatrix} \tag{17}$$

$$\begin{Bmatrix} \theta_{11}^{2} & \theta_{12}^{2} & \theta_{13}^{2} \\ \theta_{21}^{2} & \theta_{22}^{2} & \theta_{23}^{2} \\ \theta_{31}^{2} & \theta_{32}^{2} & \theta_{33}^{2} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ HDI_{t-2} \end{Bmatrix} + \ldots + \begin{Bmatrix} \theta_{11}^{p} & \theta_{12}^{p} & \theta_{13}^{p} \\ \theta_{21}^{p} & \theta_{22}^{p} & \theta_{23}^{p} \\ \theta_{31}^{p} & \theta_{32}^{p} & \theta_{33}^{p} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-p} \\ \ln LP_{t-p} \\ HDI_{t-p} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix}$$

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ \ln EXPHE_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^{1} & \theta_{12}^{1} & \theta_{13}^{1} \\ \theta_{21}^{1} & \theta_{22}^{1} & \theta_{23}^{1} \\ \theta_{31}^{1} & \theta_{32}^{1} & \theta_{33}^{1} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ \ln EXPHE_{t-1} \end{Bmatrix} \tag{18}$$

$$\begin{Bmatrix} \theta_{11}^{2} & \theta_{12}^{2} & \theta_{13}^{2} \\ \theta_{21}^{2} & \theta_{22}^{2} & \theta_{23}^{2} \\ \theta_{31}^{2} & \theta_{32}^{2} & \theta_{33}^{2} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ \ln EXPHE_{t-2} \end{Bmatrix} + \ldots + \begin{Bmatrix} \theta_{11}^{p} & \theta_{12}^{p} & \theta_{13}^{p} \\ \theta_{21}^{p} & \theta_{22}^{p} & \theta_{23}^{p} \\ \theta_{31}^{p} & \theta_{32}^{p} & \theta_{33}^{p} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-p} \\ \ln LP_{t-p} \\ \ln EXPHE_{t-p} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix}$$

Given the optimal lag selected in this study, the SVAR models become:

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ HDI_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^{1} & \theta_{12}^{1} & \theta_{13}^{1} \\ \theta_{21}^{1} & \theta_{22}^{1} & \theta_{23}^{1} \\ \theta_{31}^{1} & \theta_{32}^{1} & \theta_{33}^{1} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ HDI_{t-1} \end{Bmatrix} + \begin{Bmatrix} \theta_{11}^{2} & \theta_{12}^{2} & \theta_{13}^{2} \\ \theta_{21}^{2} & \theta_{22}^{2} & \theta_{23}^{2} \\ \theta_{31}^{2} & \theta_{32}^{2} & \theta_{33}^{2} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ HDI_{t-2} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \tag{19}$$

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} \ln RGDP_t \\ \ln LP_t \\ \ln EXPHE_t \end{Bmatrix} = \begin{Bmatrix} \theta_{11}^{1} & \theta_{12}^{1} & \theta_{13}^{1} \\ \theta_{21}^{1} & \theta_{22}^{1} & \theta_{23}^{1} \\ \theta_{31}^{1} & \theta_{32}^{1} & \theta_{33}^{1} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-1} \\ \ln LP_{t-1} \\ \ln EXPHE_{t-1} \end{Bmatrix} + \begin{Bmatrix} \theta_{11}^{2} & \theta_{12}^{2} & \theta_{13}^{2} \\ \theta_{21}^{2} & \theta_{22}^{2} & \theta_{23}^{2} \\ \theta_{31}^{2} & \theta_{32}^{2} & \theta_{33}^{2} \end{Bmatrix} \begin{Bmatrix} \ln RGDP_{t-2} \\ \ln LP_{t-2} \\ \ln EXPHE_{t-2} \end{Bmatrix} + \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \quad (20)$$

The matrix is therefore re-specified to account for contemporaneous effects and variance matrix and to avoid cross-error correlations or spill-over shocks and remove the possibility of autocorrelations as:

$$A_0 Y_t = B u_t \quad (21)$$

Where Y_t is the matrix of endogenous variables B, is the variance matrix, and u_t is the matrix of error terms. This can be presented in matrix form as follows:

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} u_t^{\ln RGDP} \\ u_t^{\ln LP} \\ u_t^{HDI} \end{Bmatrix} = \begin{Bmatrix} \delta_{\ln RGDP} & 0 & 0 \\ 0 & \delta_{\ln LP} & 0 \\ 0 & 0 & \delta_{HDI} \end{Bmatrix} \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \quad (22)$$

$$A_0 \varepsilon = \beta u_t$$

$$\begin{Bmatrix} 1 & 0 & 0 \\ -\theta_{21}^{0} & 1 & 0 \\ -\theta_{31}^{0} & -\theta_{32}^{0} & 1 \end{Bmatrix} \begin{Bmatrix} u_t^{\ln RGDP} \\ u_t^{\ln LP} \\ u_t^{\ln EXPHE} \end{Bmatrix} = \begin{Bmatrix} \delta_{\ln RGDP} & 0 & 0 \\ 0 & \delta_{\ln LP} & 0 \\ 0 & 0 & \delta_{\ln EXPHE} \end{Bmatrix} \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \quad (23)$$

$$A_0 \varepsilon = \beta u_t$$

Hence, variance forecast can be specified in matrix form as:

$$e_t = A_0^{-1} B U_t = \begin{Bmatrix} u_t^{\ln RGDP} \\ u_t^{\ln LP} \\ u_t^{HDI} \end{Bmatrix} = \begin{Bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{Bmatrix} \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \quad (24)$$

$$e_t = A_0^{-1} BU_t = \begin{Bmatrix} u_t^{\ln RGDP} \\ u_t^{\ln LP} \\ u_t^{\ln EXPHE} \end{Bmatrix} = \begin{Bmatrix} 1 & 0 & 0 \\ a & 1 & 0 \\ b & c & 1 \end{Bmatrix} \begin{Bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{Bmatrix} \quad (25)$$

a is the response of $\ln LP_t$ to $\ln RGDP_t$ shocks, b is the response of HDI_t to $\ln RGDP_t$ shocks, and c is the response of HDI_t to $\ln LP_t$ shocks from equation (24). Similarly, a is the response of $\ln LP_t$ to $\ln RGDP_t$ shocks, b is the response of $\ln EXPHE_t$ to $\ln RGDP_t$ shocks, and c is the response of $\ln EXPHE_t$ to $\ln LP_t$ shocks from equation (25).

The study also employed the Granger non-causality test, utilizing the Toda–Yamamoto technique, which remains pertinent regardless of the variable's order of integration. This approach is designed to circumvent potential biases associated with unit root and co-integration tests (Rambaldi & Doran, 1996). The Toda-Yamamoto test addresses this concern by employing augmented VAR modeling, introducing a Wald test statistic that asymptotically follows a chi-square ($\chi 2$) distribution, independent of the order of integration or co-integration properties of the time series variables. This technique incorporates a modified Wald test for restrictions on the parameters of the VAR (k), where k represents the optimal lag length of the system. The core concept involves artificially augmenting the correct order, k, by the maximal order of integration referred to as d-max. Subsequently, an estimation of the (k + d-max) order of the VAR is conducted, and the coefficients of the last lagged d-max vectors are disregarded (Caporale & Pittis, 1999). The Toda-Yamamoto specification for the HDI model can be articulated as follows:

$$\ln RGDP_t = \alpha_0 + \sum_{j=1}^{k+d\max} \alpha_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \alpha_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \alpha_{3j} HDI_{t-j} + \varepsilon_{1t} \quad (26)$$

$$\ln LP_t = \delta_0 + \sum_{j=1}^{k+d\max} \delta_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \delta_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \delta_{3j} HDI_{t-j} + \varepsilon_{2t} \quad (27)$$

$$HDI_t = \lambda_0 + \sum_{j=1}^{k+d\max} \lambda_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \lambda_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \lambda_{3j} HDI_{t-j} + \varepsilon_{3t} \quad (28)$$

The Toda Yamamoto specification for the EXPHE model can be stated as:

$$\ln RGDP_t = \alpha_0 + \sum_{j=1}^{k+d\max} \alpha_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \alpha_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \alpha_{3j} \ln EXPHE_{t-j} + \varepsilon_{1t} \quad (29)$$

$$\ln LP_t = \delta_0 + \sum_{j=1}^{k+d\max} \delta_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \delta_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \delta_{3j} \ln EXPHE_{t-j} + \varepsilon_{2t} \quad (30)$$

$$\ln EXPHE_t = \lambda_0 + \sum_{j=1}^{k+d\max} \lambda_{1j} \ln RGDP_{t-j} + \sum_{j=1}^{k+d\max} \lambda_{2j} \ln LP_{t-j} + \sum_{j=1}^{k+d\max} \lambda_{3j} \ln EXPHE_{t-j} + \varepsilon_{3t} \quad (31)$$

Results and Discussion

The study examines the stationarity properties of the series. This study examines the optimal VAR lag for the two models, the Granger causality among the variables and the transmission mechanism from human capital development to economic growth through labor productivity in Nigeria.

Results of Unit Root Test

The results of the Augmented Dickey-Fuller unit root test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root tests are presented in Table 1.

Table 1: Results of ADF Unit Root Test

Variables	ADF at level	ADF at 1st Difference	5%Critical level	KPSS Statistic at Level	KPSS Statistic at 1st Difference	Critical value at 5%	Order of Integration
lnRGDP	-0.335436	-3.773117	-2.941145	0.734981	0.292538	0.463000	I(1)
Prob	0.9100	0.0067*					
lnLP	-0.686334	-3.692925	-2.941145	0.608019	0.333046	0.463000	I(1)
Prob	0.8382	0.0082*					
LnEXPHE	-0.693872	-7.635953	-2.941145	0.748532	0.147386	0.463000	I(1)
Prob	0.8366	0.0000*					
HDI	-1.230760	-8.581324	-2.941145	0.773902	0.385071	0.463000	I(1)
Prob	0.6510	0.0000*					

Source: Computed from E-views 10 Output

Note: These critical values are computed from Mackinnon (1996), and if the probability value of a particular variable is less than the 5% critical value, we reject the null hypothesis of the variable having a unit root. The asterisk (*) denotes the rejection of the unit root hypothesis at the 5% critical level.

From the results of the ADF unit root test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) unit root test in Table 1, all the variables are integrated at the first difference, I(1). This is because their respective probability values of the ADF are less than 0.05 critical values after the first difference at the 5% significance level. More so, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) statistics are all less than the critical value of 0.46 at a 5% level of significance, unlike the statistics at levels. This shows that all the variables in the model have no unit root problem after the first difference.

VAR Lag Order Selection Criteria

The results of the VAR lag selection criteria are presented in Table 2. The VAR lag selection criterion test was used to select the optimal lag for the two models (the HDI model and the EXPHE model) that can yield robustness. The results are presented as follows:

Table 2: VAR Lag Order Selection Results

Lag	LogL	LR	FPE	AIC	SC	HQ
HDI Model						
0	152.1393	NA	6.33e-08	-8.06158	-7.93097	-8.01554
1	337.4127	330.4876	4.62e-12	-17.5899	-17.0674	-17.4057
2	361.5551	39.14999*	2.06e-12*	-18.40839*	-17.49408*	-18.08605*
3	369.2808	11.27528	2.27e-12	-18.3395	-17.0334	-17.879
EXPHE Model						
0	155.1407	NA	3.36e-08	-8.693755	-8.560439*	-8.647734
1	163.5765	14.94346	3.49e-08	-8.661516	-8.128254	-8.477434
2	175.4261	18.95933	3.00e-08	-8.824349	-7.891141	-8.502206
3	191.9664	23.62900*	2.02e-08*	-9.255224*	-7.922068	-8.795018*
4	197.0976	6.450577	2.68e-08	-9.034146	-7.301044	-8.435879

Source: E-views 10 output

The results presented in Table 2 indicate that lag two (2) exhibits the lowest values for AIC, SC, and HQ compared to other HDI model lags.

Similarly, lag four (4) shows the lowest FPE, AIC, and HQ compared to alternative lags. This implies that the optimal lag choices for both the HDI and EXPHE models are identified as lag two (2) and four (4).

Causality Test Results

The Toda Yamamoto Granger causality test results are presented in Table 3. The results explain the relationship between economic growth and labor productivity and between labor productivity and human capital development in Nigeria at the 5% significance level.

Table 3: Toda Yamamoto Granger Causality Test Results

HDI Model				EXPHE Model			
Dependent variable: lnRGDP				Dependent variable: lnRGDP			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
LnLP	0.698619	2	0.7052	lnLP	1.564044	4	0.8152
HDI	0.816748	2	0.6647	lnEXPHE	5.218433	4	0.2656
All	1.112132	4	0.8923	All	9.009087	8	0.3415
Dependent variable: lnLP				Dependent variable: lnLP			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
lnRGDP	0.773737	2	0.6792	lnRGDP	3.489776	4	0.4794
HDI	1.127390	2	0.5691	lnEXPHE	5.553696	4	0.2350
All	2.646634	4	0.6186	All	11.43693	8	0.1781
Dependent variable: HDI				Dependent variable: lnEXPHE			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
lnRGDP	6.042604	2	0.0487	lnRGDP	8.894013	4	0.0638
lnLP	5.342552	2	0.0692	lnLP	12.86164	4	0.0120
All	6.711674	4	0.1519	All	36.09917	8	0.0000

Source: E-views 10 output

From the results in Table 3, there is a unidirectional relationship running from economic growth to human capital development at 5% and 10% levels of significance from the estimates of the HDI and EXPHE models, respectively. The study also found a unidirectional relationship running from labor productivity to human capital development at a 5% and 10% significance level from the estimates of the EXPHE and HDI models, respectively. The study also shows joint causality of economic growth and labor productivity on human capital development at a 1% significance level.

Co-integration Test Results

Having confirmed that all the series are integrated of order one, the Johansen co-integration test was employed to assess whether there is a long-run relationship among the model variables. The results are presented in Table 4.

Table 4: Johansen Co-integration Test Results

HDI Model					EXPHE Model				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.616851	50.09754		0.0001	None *	0.476732	35.96413	29.79707	0.0086
		29.79707							
At most 1	0.283498	14.60228	15.49471	0.0678	At most 1	0.257240	13.29599	15.49471	0.1044
At most 2	0.059441	2.267413	3.841466	0.1321	At most 2	0.079191	2.887611	3.841466	0.0893
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.616851	35.49527	21.13162	0.0003	None *	0.476732	22.66814	21.13162	0.0302
At most 1	0.283498	12.33487	14.26460	0.0987	At most 1	0.257240	10.40838	14.26460	0.1865
At most 2	0.059441	2.267413	3.841466	0.1321	At most 2	0.079191	2.887611	3.841466	0.0893

Source: E-views 10 output

The results presented in Table 4 indicate the existence of a single cointegrating equation at the 5% significance level. Trace and Max-Eigen statistics reveal compelling evidence of a long-term relationship among the variables. Consequently, it is substantiated that a long-term relationship exists among the model variables.

Contemporaneous Effects

The SVAR contemporaneous effects are further assessed using the estimates from the two models. The structural VAR estimates assessed the responses of economic growth to shocks in labor productivity and human capital development and the response of labor productivity to shocks in human capital development. The results of the SVAR contemporaneous effects are presented in Table 5.

Table 5: Contemporaneous Effects

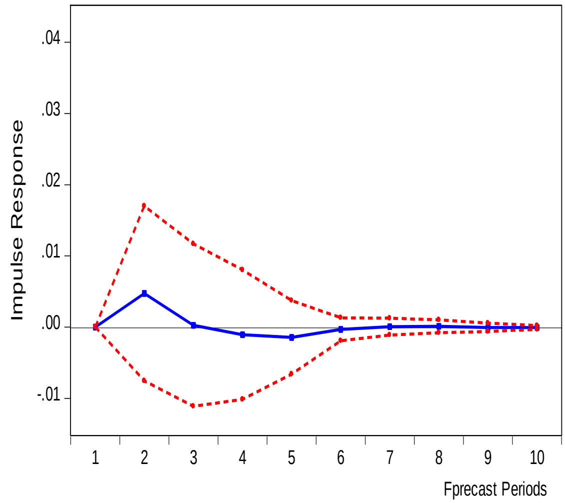
HDI Model				EXPHE Model			
	RGDP	LNLP	HDI		RGDP	LNLP	HDI
lnRGDP	1	0	0	ln RGDP	1	0	0
lnLP	0.949705	1	0	lnLP	0.942018	1	0
Probability	0.000			Probability	0.000		
HDI	0.115768	0.157291	1	lnEXPHE	5.272033	2.001328	1
Probability	0.2288	0.1087		Probability	0.2659	0.6759	

Source: culled from E-views 10 output

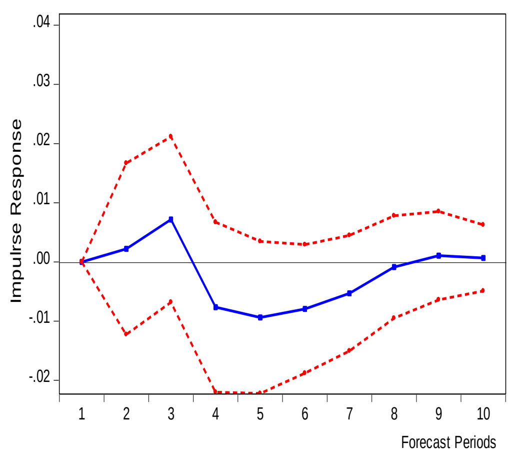
Table 5 reveals that economic growth significantly and positively responded to a shock in labor productivity by 0.9497% and 0.942% for the HDI and EXPHE models contemporaneously. Similarly, economic growth instantaneously responds positively to shocks in human capital development by 0.115768% and 5.272% for the HDI and EXPHE models, respectively. The response is insignificant at the 5% level of significance. The matrix of contemporaneous effects also indicates that the instantaneous effect of human capital development on labor productivity in Nigeria is also positive but not statistically significant at the 5% level of significance. An increase in human capital development accelerates growth in Nigeria. However, the instantaneous effects show a weak influence, especially between human capital development and labor productivity, from the results of the two models. This explains why it takes a long period for human capital development to exert a strong influence on the level of labor productivity.

Results of Impulse Response

The results of the impulse response of real gross domestic product to shocks in labor productivity and human capital development are presented in Figures 1 and 2. The impulse response of economic growth to shock in labor productivity in Nigeria is depicted in Figure 1.



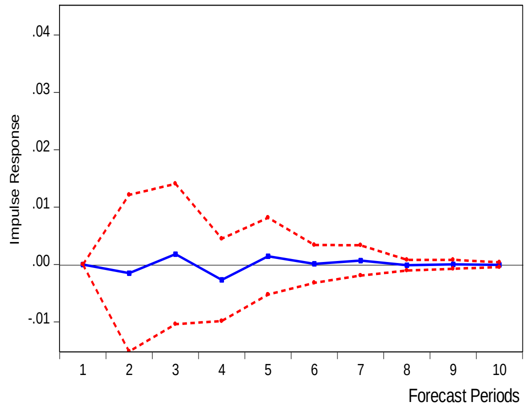
HDI Model



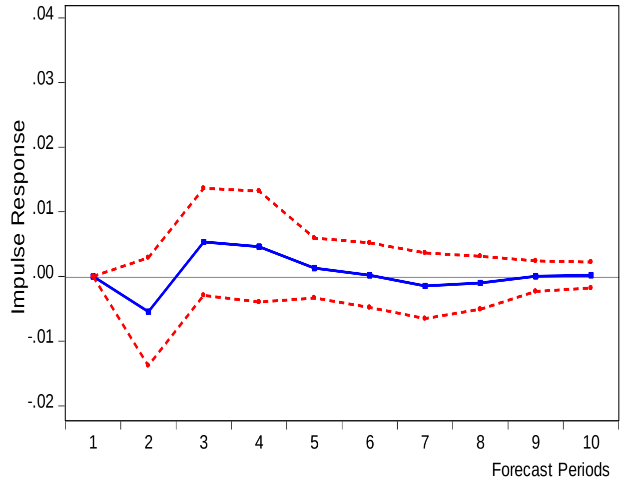
EXPHE Model

Figure 1: Impulse Response of Economic Growth to Shock in Labor Productivity in Nigeria

Figure 1 depicts that economic growth responds temporarily to a standard deviation shock in labor productivity in Nigeria throughout the forecast period. The result shows that the response of economic growth to shock in labor productivity increases slightly in the short-run but decreases between the fourth and sixth forecast periods. The response converges to zero in the long run from the two models' estimates. This implies that a shock in labor productivity would cause economic growth in Nigeria to respond positively in the short run, unlike the long run.



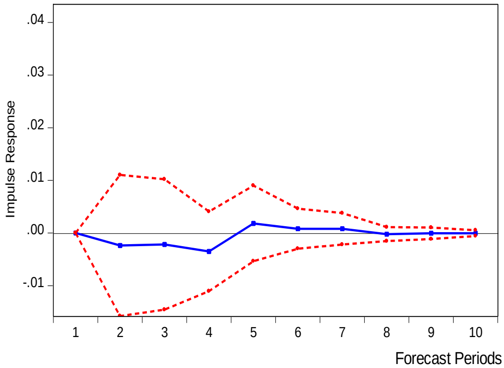
HDI Model



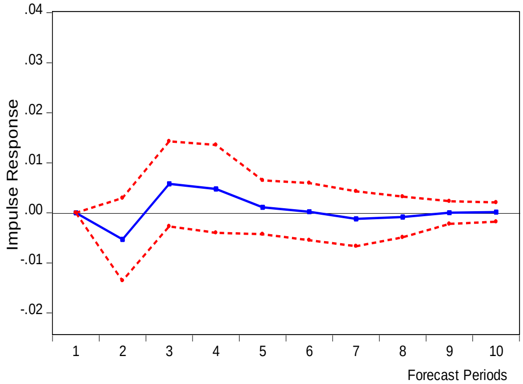
EXPHE Model

Figure 2: Impulse Response of Economic Growth to Shock in Human Capital Development in Nigeria

The result of the impulse response of economic growth to a shock in human capital development shows that the initial response of the economy to a shock in human capital development was negative from the estimates of both models. However, the response turns positive in the third period from the forecast of the EXPHE model, unlike the wavelike response from the forecast of the HDI model. The response of economic growth also converges towards zero in the long run for both forecasts of the two models. This implies that shocks in human capital development would temporarily cause an initial negative response to economic growth but recover to a positive response in the middle term or long run.



HDI Model



EXPHE Model

Figure 3: Impulse Response of Labor Productivity to Shock in Human Capital Development in Nigeria

The result of the impulse response of labor productivity to shock in human capital development shows that the initial response of labor productivity to shock in human capital development was negative from the estimates of both models. However, the response turns positive in the third period from the forecast of the EXPHE model, unlike the fifth period recovery from the forecast of the HDI model. The response of economic growth also converges towards zero in the long run for both forecasts of the two models. The response of economic growth to shocks in human capital development and the response of labor productivity to shocks in human capital development are similar. The response of labor productivity implies that shocks in human capital development would temporarily cause an initial negative response of labor productivity but recover to a positive response in the long run.

Results of Accumulated Forecast Error Variance

The results of the accumulated forecast error variance for the two models are presented in Table 6.

Table 6: Variance Decomposition of Economic Growth in Nigeria

	HDI Model			EXPHE Model		
Period	D(lnRGDP)	D(lnLP)	D(HDI)	D(lnRGDP)	D(lnLP)	D(lnEXPHE)
Initial Periods	100%	0%	0%	100%	0%	0%
Short-run (Third year)	98.15%	1.48%	0.37%	92.56%	3.66%	3.78%
Long-run (10th year)	97.36%	1.65%	0.99%	79.39%	16.04%	4.57%
Decision	Decreasing	Increasing	Increasing	Decreasing	Increasing	Increasing

Source: Culled from E-views 10 Output

The findings in Table 6 provide insights into shock dynamics and its impact on economic growth. According to the forecast estimates of the HDI model, it is revealed that shock in economic growth is responsible for 100% of the variations in economic growth in the initial period, approximately 98.15% in the short term (third forecast period), and around 97.36% of the variations in economic growth in the long term (tenth forecast period). This suggests a diminishing influence of changes in economic growth due to self-generated shocks over the forecast period. A parallel trend is observed in the EXPHE model, with approximately 92.56% in the short run (third forecast period) and approximately 79.39% of the variations in economic growth in the long run (tenth forecast period) attributable to innovation.

Furthermore, the forecast estimates highlight that shocks in labor productivity account for approximately 1.48% and 1.65% of the accumulated forecast error variance of economic growth in the third year (short run) and tenth year (long run) in the HDI model. Similarly, the EXPHE model reveals that approximately 3.66% and 16.04% of the accumulated forecast error variance of economic growth in the short run (third year) and long run (tenth year), respectively, are explained by shocks in labor productivity. This indicates a positive trajectory in the impact of labor productivity innovations on economic growth over the forecast periods.

Interestingly, according to the HDI model forecast estimates, the results indicate minimal variation in economic growth due to innovation in human capital development—0.3% and 0.99% in the short run and long run, respectively. However, there is a slight enhancement in the variations in economic growth attributed to shocks in human capital development, measured by government expenditure on health and education. This implies that variations in economic growth are likely to increase over time due to innovations in human capital development.

The study suggests that, particularly based on the EXPHE estimates, variations in economic growth are predominantly influenced by innovations in self-generated shocks and labor productivity. Additionally, the results indicate a declining trend in variations in economic growth due to self-generated shocks over time, contrasting with the enduring impact of shocks in labor productivity and human capital development.

The results of the accumulated forecast error variance of labor productivity due to shocks in real gross domestic product, labor productivity, and human capital development in Nigeria are summarized and presented in Table 7.

Table 7: Variance Decomposition of Labor Productivity in Nigeria

	HDI Model			EXPHE Model		
Period	D(lnRGDP)	D(lnLP)	D(HDI)	D(lnRGDP)	D(lnLP)	D(lnEXPHE)
Initial Periods	93.72%	6.28%	0%	90.55%	9.45%	0%
Short-run (Third year)	86.89%	12.43%	0.67%	81.18%	14.99%	3.83%
Long-run (10th year)	85.88%	12.46%	1.66%	70.38%	25.11%	4.51%
Decision	Decreasing	Increasing	Increasing	Decreasing	Increasing	Increasing

Source: Culled from E-views 10 Output

The study investigates the impact of shocks in human capital development on the fluctuations in labor productivity. According to the forecast estimates, a shock in human capital development elucidates approximately 0.67% and 1.66% of the accumulated forecast error variance of labor productivity in the third year (short-run) and tenth year (long-run), respectively, as per the forecast estimates of the HDI model. Similarly, the EXPHE model yields approximately 3.83% and 4.51% of the accumulated forecast error variance of labor productivity in the third year (short-run) and tenth year (long-run) in the event of a shock in human capital development. This implies that variations in labor productivity attributed to innovations in human capital development are anticipated to experience a marginal positive increase over the forecast periods.

Contrastingly, the results from other forecasts underscore that innovations primarily influence variations in labor productivity in economic growth and self-generated shocks. Additionally, the findings indicate that variations in labor productivity due to self-generated shocks are likely to improve over time, presenting a divergence from the trajectory of shocks in economic growth.

Conclusion and Policy Recommendations

The study concludes that investments in human capital development exert a lasting influence on the overall level of economic growth, with more pronounced variations in economic growth attributable to shocks in labor productivity. Consequently, the study puts forth the following recommendations:

The Nigerian government substantially increased its allocation, emphasizing a massive investment in human capital development. This entails a particular focus on improving both the education and health sectors. The study underscores the importance of prioritizing budg*et al*locations for these sectors, recognizing their significant potential to drive growth in Nigeria through enhanced labor productivity.

The study highlights the need for the Nigerian government to intensify efforts in the human capital development process. There is a specific call to prioritize budg*et al*locations for the health and education sectors. This strategic emphasis recognizes these sectors' pivotal role in driving growth, particularly through their positive impact on labor productivity. The study emphasizes that fostering sound health is crucial for improving overall labor productivity in the country.

The research urges the Nigerian government to increase investment in human capital development and strategically allocate resources to the health and education sectors. By doing so, Nigeria can unlock the growth-driving potential inherent in these sectors, particularly by enhancing labor productivity.

There is a need for improvement in collaborative approaches whereby educational institutions and players in the industrial sector jointly help design educational curricula to reflect organizational realities. This should be reviewed periodically to ensure that feedback between the market and the educational institutions is carried out. The Nigerian government should also make resources available for research and ensure that such funds are properly disbursed and utilized.

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