

Dynamics of Human Capital Development and Quality of Governance on Economic Growth in Sub-Saharan Africa

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ABSTRACT

Economic growth remains a central objective for policymakers and development strategists across Africa, particularly in the sub-region known as Sub-Saharan Africa (SSA). The study investigates the dynamic impact of government expenditure on education, government expenditure on health, per capita income and government effectiveness on economic growth in 38 Sub-Saharan African countries over the period 2014-2024. The system GMM shows that government expenditure on education was found to exert a weak, marginally positive effect on growth, while government expenditure on health showed no statistically significant effect. Government effectiveness and per capita income were both negatively and significantly associated with growth in the dynamic specification, results attributable, respectively, to the possibility that most SSA countries have not yet crossed the governance threshold at which institutional quality becomes growth-enhancing. The study recommends that Sub-Saharan African governments should increase budgetary allocation to education, with priority given to basic, secondary and technical education that build productive skills rather than a disproportionate focus on tertiary education, and should encourage public-private partnerships to complement government funding and improve delivery efficiency, so that the currently weak effect of education spending on growth can be strengthened over time.

Keywords: Human Capital development, Quality of Governance, Economic growth, Sub-Saharan Africa

INTRODUCTION

Economic growth remains a central objective for policymakers and development strategists across Africa, particularly in the sub-region known as Sub-Saharan Africa (SSA). For decades, despite periodic spurts of growth, SSA countries have struggled to achieve sustained, inclusive, and structurally transformative growth. This has often been ascribed to low levels of human capital, weak institutional quality, poor governance, and the failure to leverage demographic dividends in a way that translates into productivity and growth. Thus, understanding the role that human capital development and quality of government (or institutional quality) play in shaping economic growth in SSA is not only academically relevant but of critical practical importance. The notion of human capital broadly defined as the stock of skills, education, health, competencies, and capacities embodied in individuals is central to modern growth theory. Pioneering endogenous growth theorists like Paul Romer and Robert Lucas emphasized that human capital accumulation is a key driver of long-run economic growth, through channels like increased labour productivity, innovation, and knowledge spillovers. Education and health are often used as proxies for human capital (Romer, 1986; Lucas, 1988). Empirically, many studies support a positive link between human capital and economic growth, though the magnitude and robustness of this relationship vary depending on context, measurements, and additional institutional factors. According to the UNDP, the human development index (HDI) is a measure of how well human development is progressing. Three composite indicators are used in the HDI to measure a country's average level of human development achievement: Long life, as measured by life expectancy at birth; education, as measured by typical lengths of schooling and the percentage of residents aged 15 and over who are literate; and a decent level of living, as measured by per capita income. Many countries use the Human Development Index (HDI) to measure human quality due to the process of development. In 2010, after twenty years, the UNDP upgraded its HDI assessment method (Maqin & Sidharta, 2017). Human capital consists of the knowledge, skills, and health that people invest



in and accumulate throughout their lives, enabling them to realize their potential as productive members of the society (World Bank, 2021). Better standard of living in the form of good healthcare, quality education, availability of jobs and skill acquisition help develop human capital and therefore a key to ending extreme poverty and creating more inclusive societies.

Human capital development requires more than good education, health care and skills. This is because, the circumstances preceding, surrounding and succeeding conception of a human being will all influence and determine the kind of human capital the child will become in future. Hence, the basis for measuring and ranking economic performance changed from income criteria to people-centered criteria and improvement in the quality of life and well-being of the citizenry became the prominent economic development indicator (United Nations Development Programme - UNDP, 1997a). Sen (1995) defined human development as the process of enlarging people's choice, improvement in the standard of living and increasing capabilities. It further emphasizes investment in education, health, nutrition and income. Based on a growing need to improve human welfare, the United Nation Development Program (UNDP) introduced the Human Development Index (HDI) in 1990 as a policy tool for comparing development achievement among countries and regions of the world. Countries were divided into very high, high, medium and low human development categories on the basis of the levels of human development attained. The annual Human Development reports of the UNDP show the human development index score attained by countries of the world ranging from 0 (low human development) to 1 (very high human development). In the Human Development Report (2016), no African country was ranked among the fifty countries in the category of very high and high human development despite availability of abundant resources. Few African countries including Gabon, Botswana and South Africa were in the middle human development category while others including Nigeria were categorized as low human development countries.

For Sub Saharan Africa, empirical studies have increasingly emphasized that good governance and institutional quality significantly influence economic growth. For instance, a panel data study of 31 SSA countries (1991–2015) using a two-step system-GMM method concluded that institutions that promote investment, regulatory quality, and democratic governance have a significant positive effect on economic growth; but institutions primarily designed to prevent conflict did not show a significant effect (Hussen, 2023). More recent work (2025) shows that institutional quality is significantly associated with improvements in macroeconomic productivity across 38 SSA countries over 2003–2020, reinforcing the view that institutional quality matters for broad-based productivity and growth (Discover Global Society, 2025). Another recent contribution argues that human capital and institutional quality are complementary: without robust institutions, investments in human capital (education, health) may not translate into structural transformation or productivity gains (Discover Sustainability, 2025). The interplay between human capital and institutional quality appears vital in transforming growth into structural change for example, by making manufacturing sectors more productive and competitive. The main objective of this study is to investigate the dynamic impact of government expenditure on education, expenditure on health, per capita income and government effectiveness on economics growth in Sub-Saharan Africa from 2014 to 2024, the paper is structure as follows section two is the literature, section three is the methodology for the paper, section four discussed the result and findings and section five contained conclusions and recommendations.

LITERATURE REVIEW

2.1 Conceptual literature

Human Capital Development: The concept of human capital is not easily amenable to a general definition because different authors have defined it in different ways since the concept is a complex and multifaceted one. Adam Smith (1776) was the first classical economist to have included human capital in his definition of capital. He included in the capital stock of a nation the inhabitants' acquired and useful talents, adding that human skills increase wealth for society as well as for the individual. In the recent literature, OECD (2001), defined human capital as the knowledge, skills, competencies and attributes embodied in individuals that facilitates the creation of personal, social and economic well-being. Human capital is also represented by the aggregation of investments in activities such as education, health, on-the-job training and migration that enhances an individual's productivity in the labour market (Kiker 1966). Similarly, Yesufu (2000) in Okojie (1995) indicated that human



capital is formed through investment in education, training, health promotion, and investments in social services that influence man's productive capacities and that human capital formation is the process of acquiring and increasing the number of persons who have skills, education and experience which are critical for economic and political development of a country. It is generally believed that human capital is the most important factor of production because it is human capital that coordinates other factors of production to produce goods and services meant for human consumption. Human capital is the most active catalyst of economic growth and development. He concluded that human capital is more than educational attainment of a population. It is the total stock of human resources that a country has from which it can pool skills, knowledge, entrepreneurial and innovative capacities required to produce, distribute and utilize ideas, goods and services to generate growth and development. Human capital development was described as an end or objective of development. It is a way to fulfil the potential of people by enlarging their capabilities, and this necessarily implies empowerment of people, enabling them to participate actively in their own development. Human capital development is also a means since it enhances the skills, knowledge, productivity and inventiveness of people through a process of human capital formation broadly conceived. Thus, human capital development is a people centered strategy, and not goods centered or production centered strategy of development. What really matters are the empowerment of people to identify their own priorities and to implement programmes and projects of direct benefit to them.

2.1.1 Governance

The term "governance" has been defined several times by various academics. Despite the many meanings, it appears that the term "governance" refers to the political sphere and political action as the essential role of every national government, regardless of which definition one uses. There is a difference between good governance and government, which we want to underline from the beginning. Because government and good governance aren't the same, despite their shared purposes. Good governance, on the other hand, refers to the conception, execution, and implementation of activities supported by shared aims of people and organizations, regardless of whether such organizations or individuals have official authority or policing capacity (Rosenau 1992 and Bingham et al. 2005). Furthermore, when it comes to government, it's all about bureaucracy, law and financial regulation, as well as coercion. Non-regulatory policy instruments, on the other hand, are increasingly being used as a means of promoting good governance. Through the employment of this policy tool, non-state actors in collaboration with governments can be encouraged to propose, create, and implement cooperative projects (Jordan et al. 2003). Overall, excellent governance is becoming more commonplace in our society. A substantial and ever-expanding body of research exists on the topic of government (Aminuzzaman 2010). When used historically, such as in the fourteenth century, the term "good governance" denoted a technique, activity, or function of government (Halfani et al. 1994). A nation's system of politics, as well as its administration and regulation of state activities, constitutes good governance for Landell et al. (1991).

According to Graham et al. (2003), effective governance is defined as the interaction of structures, procedures, and traditions that determines how authority and responsibility are exercised, choices are made, and people and other stakeholders have their voice heard. Consequently, successful governance is about power, relationship, and accountability: it tackles concerns like who has the authority, who makes the choices, and how decision-makers are held responsible. To ensure an open and legitimate relationship between civil society and the state, Halfani et al (1994) defined good governance as a system of government that focuses on effective and accountable institutions, democratic principles and electoral processes, representation and responsible government structures. They focused on the vital connection between civil society and the state. Since this distinguishes the study of good governance from government, it's an essential one.

Similar to the OECD (1995) definition of good governance, which includes public administration as well as the institutions and methods used to govern the country, the relationship between government and its citizens (including businesses and other citizen groups) and the state's function are all part of good governance. For today's twenty-first century concerns, understanding the interaction between state and non-state entities is critical. This is due to economic globalization, widespread corruption of state agencies, the collapse of centrally planned economies, elitist bureaucracy, and the spectacular breakthrough of information technology in emerging countries (e.g., Hossain 2001; Salomon and Anheier 1996; Anheier and Seibel 1990). Public management and public policy studies have two distinct methods to interpretation and redefinition.

2.2 Theoretical literature

Romer (1990) formulated an explicit growth model with technical progress resulting from deliberate actions taken by private agents who respond to market incentives. A key feature of Romer's model is the introduction of imperfect competition in the capital goods sector, which makes it possible to model a firm's behaviour as engaging in deliberate research activities and thereby being compensated with monopoly rents for a successful innovation. By introducing profit-seeking research behaviour in the growth model, Romer generates an explanation for technological progress inside the model. Romer's analysis is based on three assumptions:

- i. Economic growth is driven by technological progress as well as capital accumulation;
- ii. Technological progress results from deliberate actions taken by private agents who respond to market incentives and
- iii. Technological knowledge is a non-rivalrous input (modeled as positive knowledge spill-over).

2.3 Empirical Literature

Simeon (2024) examined Human Capital Investment and Human Development Index in Nigeria. Human Capital Investment was proxied by capital expenditure on education, recurrent expenditure on education, capital expenditure on health, recurrent expenditure on health and tertiary enrolment, which was regressed against HDI. From the result of the various tests, it was revealed that while some of the outcomes conformed to apriori expectations, others did not conform to apriori expectations. The results show that there is a positive correlation as well, which will eventually raise Nigeria's human development index. Further research is necessary to reduce unnecessary spending on health and education since these sectors have a substantial impact on the nation's economy and human development capacity.

Akinola, Awolaja and Onakoya (2024) examined the effect of human capital flight on economic growth in Sub-Saharan Africa using Panel Corrected Standard Error (PCSE) estimation technique. The study used real GDP growth as the dependent variable, while the explanatory variables included net migration rate, education expenditure, labour force participation, remittances, and foreign direct investment. The findings revealed that human capital flight and migration significantly influence economic growth in Sub-Saharan Africa. The study recommended increased investment in education and skills acquisition to reduce brain drain and improve productivity.

Ochi, Saidi and Labidi (2024) explored whether there exist nonlinear threshold effects of governance quality on poverty rate. The study data consist of 57 South Asian and sub-Saharan African countries for the period 2010–2019. The dynamic panel threshold model was applied to determine the optimal level of governance index, which once attained, will make the different levels of poverty decrease with governance quality. The study discovered a nonlinear relationship between poverty and the quality of governance. Furthermore, the findings indicate that, in South Asian and sub-Saharan African nations, governance quality reduces extreme poverty above a threshold level of 0.2, indicating a statistically negative association between the two. The results also showed that once the governance index hits a threshold level of 0.62 and 0.70, respectively, the poverty headcount ratio at \$3.20 and \$5.50 begins to decline.

Abdulwahab (2024) examined the role of institutional quality and human capital development on economic growth in 47 Sub-Saharan African countries using fixed effects regression analysis. Economic growth measured by GDP per capita served as the dependent variable, while the independent variables included human capital index, government effectiveness, rule of law, regulatory quality, control of corruption, political stability, and trade openness. The study found that weak institutional quality reduces the contribution of human capital development to economic growth in Sub-Saharan Africa.

Ilyas, Banaras, Javaid, and Rahman (2023) investigated the long run & short run effects of the independent variables for the Sub-Saharan African countries by using Auto regressive and Lag distributive (Co-integration) model. The results showed that the GDP to poverty head count ratio and foreign direct investment had a negative long-term impact. Additionally, the fragments of evidence demonstrated that FDI has not had any discernible



impact on poverty over a shorter time frame. Furthermore, in the short term, GDP, trade openness, and inflation all work well to lower poverty. In the meantime, inflation encourages investors to increase their investments in the manufacturing sector, which ultimately lowers unemployment and poverty. The study recommended that investors, legislators, and government representatives increase their financial support for developing nations. Since FDI is essential to the creation of jobs for the unemployed, people's incomes and standards of living rise.

Alemeu (2022) investigated the effect of political institutions and human capital on economic growth in Sub-Saharan African countries using the Arellano-Bond Dynamic Panel Estimation technique. The dependent variable was real GDP growth, while the independent variables included political stability, voice and accountability, secondary school enrolment, tertiary school enrolment, labour force participation, investment rate, and inflation. The study found that political institutions and human capital development positively influence economic growth in Sub-Saharan Africa.

Sajoh (2021) examined the effect of human capital on economic growth in selected Sub-Saharan African countries using the System Generalized Method of Moments (SGMM). The study employed GDP growth rate as the dependent variable, while education expenditure, health expenditure, secondary school enrolment, institutional quality, inflation rate, and foreign direct investment were used as explanatory variables. The findings showed that human capital indicators positively affect economic growth, while weak institutions hinder economic performance in the region.

Akinlo and Oyeleke (2020) investigated the relationship between human capital formation and economic growth in 36 Sub-Saharan African countries from 1986–2018 using Dynamic Generalized Method of Moments (GMM). The dependent variable was GDP growth rate, while the explanatory variables included school enrolment, life expectancy, government expenditure on education, government expenditure on health, gross capital formation, labour force, and inflation. The results showed that human capital indicators positively and significantly affect economic growth in Sub-Saharan Africa.

Appiah, Amoasi and Frowne, (2019) examined the impact of Human Development on Economic Growth and Development in African countries, between 1990 and 2015. The study employed Human Development Index as the main variable of interest with GDP considered as the dependent variable with inflation, capital, investment and labour as control variables. The results show that there is existence of a positive and significant impact of human development on economic growth and development in Africa.

Muhammad, Abiodunand and Manzoor (2018) examined the impact of Human Capital, Social Capabilities on Economic Growth. Using panel data for 132 countries over 15 years and utilizes Fixed Effects (FE) models, Random Effects (RE) models and Generalized Method of Moments (GMM). The study reveals that human capital plays a positive role in per capita GDP growth only in the presence of better economic opportunities and high-quality legal institutions. In fact, economic opportunities reinforce the effect of human capital on growth.

Adekoya (2018) examined the relationship between some elements of human capital development and poverty alleviation in Nigeria, from 1995- 2017. The study uses Granger causality test through a vector error correction mechanism (VECM), to determine whether the elements of education and health care of any precedence or effects on per capita income. The findings show that government spending on health and education, infant mortality, the gross enrolment ratio, and per capita income do not exhibit either unidirectional or bidirectional causality; however, there are instances of unidirectional causality for life expectancy, literacy rate, and per capita income.

Ogunleye, Owolabi, Sanyaolu, and Lawal (2017) examined the impact of human capital development on economic growth of Nigeria, using annual time series data from 1981 to 2015. The results show that human capital development has significant impact on economic growth, as proxy by the gross domestic product. In line with theory, the human capital development indicators namely secondary school enrolment, tertiary school enrolment, total government expenditure on health and total government expenditure on education exhibit positive and statistically significant impact on economic growth of Nigeria which implies that these indicators are indispensable in the achievement of growth in the Nigerian economy.

Olusola (2016) investigated and compared the impacts of physical and human capital development on economic growth in these two regions a panel data approach and uses Fixed Effect Model. The Study found that human capital contributes to GDP in developed region through investment flow in primary and tertiary education. However, the result further showed that developing countries have neglected basic primary and secondary education with focus on tertiary education which may lack quality to contribute to GDP due to poor foundation as a result of poor attention to primary and secondary education.

Oboh, Rahmah and Abu (2016) investigated the impact of human capital development on economic growth in Nigeria during the period 1970 to 2008. Johansen co-integration technique and vector error correction analysis were used to ascertain this relationship. The result indicates that human capital development has a significant impact on Nigeria's economic growth.

Chukwubudom (2016) examined the impact of human capital development on poverty reduction in Nigerian economy from the period 1986 to 2012. The Ordinary Least Squares (OLS), Augmented Dickey- Fuller and Johansen Co-integration methods were used to estimate the model of one dependent variable (poverty rate) and four explanatory variables (primary school enrolment, secondary school enrolment, tertiary school enrolment and per capita income). The study found that the growth of human capital and the fight against poverty in Nigeria are positively correlated.

Haq et al, (2015) investigated the impact of social capital on educational attainment. The author used primary data of southern Punjab (Bahawalpur and Bahawalnagar District), Pakistan from 600 household head. This study finds that the social capital is more important than financial capital. Results also proves that the positive and significant relation among educational expenditure and educational attainment. The study considered the parent's education as human capital and results shows that parent's human capital has strong and positive effects on children education. The study recommends that focus of educational policies should be on financial capital and put close consideration to hidden factors that plays key role in education development and economic growth. The (LDCs) secondary education in intermediate countries and tertiary education in OECD countries.

Banerjee and Roy (2014) examined the significance of human capital, technological progress, and trade in determining India's long-run growth by applying an improved growth accounting framework and autoregressive distributed lag (ARDL)-based cointegration technique to identify the factors that drive long-run productivity growth. Their results indicated that both the domestic technology capability building and foreign technology spillovers are important forces in determining India's long-run growth. Human capital has turned out to be the most significant factor. Trade plays a facilitating role by making available frontier technology in an embodied form from the rest of the world.

Alika, Iyere Joseph, Stan Aibieyi (2014) highlighted the human capital: definitions, approaches and management dynamics. The approaches as identified and applied in the study, found its root in business economics theory which when effectively applied, has the capacity to act as change agent on employee's performance leading to organizational success. The study reveals that management principles as embedded in management dynamics cannot be ignored by organization that is poised for serious business. The study results are mainly based on the definitions of human capital and the exposition of its approaches to the understanding of the nature, status and importance of human capital in all facets of life.

Mohsen and Maysam (2013) look at the relationship between economic growth and human capital in developing countries. And employ panel unit root tests and panel co-integration analysis for the period 1970-2010. The findings of this study support the point of view that it is higher economic growth that leads to higher education proxy. It seems that as the number of enrolments raise, the quality of the education declines.

Ogujiuba (2013) conducted a research on the impact of human capital formation on economic growth in Nigeria using annual time series data from 1970-2010. The Error Correction was employed model as an analytical tool to empirically examine the relationship between economic growth and human capital development. Findings also showed 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.

Qadri and Waheed (2013) reported that human capital is positively related to economic growth, and the rate of returns on human capital in the low-income countries is higher than the rate of returns on human capital in the middle- and higher-income countries across the world. Furthermore, a strong cointegration relationship has also been reported by Lee (2005) between physical, human capital, and economic growth for Korea's sustained economic growth based on the growth accounting technique. However, de Oliveira, Santos, and Kiker (2000) revealed a trade-off between the forms of human capital proxies (over education and under education); there is a positive relationship between over education and economic growth, while there is a negative relationship between under education and economic growth, but based on the tenure (i.e., employer's preference relative to demand for overeducated labor).

Gap identified

A review of existing empirical studies reveals extensive work on the relationship between human capital, human development, governance, poverty, and economic growth across developing economies. However, despite the rich body of evidence, several gaps remain unaddressed. many studies on human capital and human development in Nigeria have relied on single-equation time-series methods. For example, Simeon (2024) used traditional regression techniques to evaluate how capital and recurrent expenditures on health and education impact the Human Development Index (HDI). Although the study identified mixed results concerning a priori expectations, it did not account for endogeneity, dynamic interactions, or feedback effects among variables. Similar limitations are present in Ogujiuba (2013) and Adekoya (2018), who used VECM and error-correction models that provide short-run and long-run relationships but do not capture the deeper dynamic causal pathways of human capital within a multidimensional development structure. Furthermore, several international studies focus on nonlinearities and thresholds. For example, Ochi, Saidi, and Labidi (2024) applied a dynamic panel threshold model to governance and poverty but did not integrate human capital variables or link governance dynamics to HDI performance. Likewise, Ilyas et al. (2023) explored the long- and short-run effects of GDP, FDI, and macroeconomic variables on poverty using ARDL-based cointegration but excluded human capital-related indicators and did not investigate dynamic systems behavior among variables. Across African contexts, Appiah et al. (2019), Muhammad et al. (2018), and Oboh et al. (2016) documented that human development and human capital generally promote economic growth. However, these studies used Fixed Effects, Random Effects, OLS, Johansen cointegration, and GMM without exploring simultaneous interactions among multiple human capital dimensions, economic growth indicators, and human development outcomes.

METHODOLOGY

3.1 Theoretical framework

The model used in this study is the human capital theory model based on Romer (1990). The theory states that growth is influenced by not only labour and capital but also human capital as is shown in equation 3.1

$$Y_t = f(K_t L_t H_t) \dots \dots \dots (3.1)$$

Where Y_t is output, K_t is capital, L_t is the labour and H_t is human capital. Introducing government effectiveness into the model (Equation 3.1), we have the following:

$$Y_t = f(K_t L_t H_t G_t) \dots \dots \dots (3.2)$$

The model of the study is specified as

$$RGDP_t = f(GEE, GEH, PCI, GE, EXR) \dots \dots \dots (3.3)$$

The econometric model can be specified as

$$RGDP_{it} = \alpha_0 + \alpha_1 GEE_{it} + \alpha_2 GEH_{it} + \alpha_3 PCI_{it} + \alpha_4 GE_{it} + \alpha_5 EXR_{it} + \varepsilon_{ti} \dots \dots \dots (3.4)$$

Where

$RGDP_t$ = Real Gross domestic product

GEE_t = Government Expenditure on Education

GEH_t = Government Expenditure on Health

PCI_t = Par capita income

GE_t = Government effectiveness

EXR_t = Exchange rate

ε_t = is the error term

$\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$, and α_6 are the parameters to be estimated whereas, the a priori expectations are > 0 .

The countries are Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Congo, Democratic Republic, Cote d'Ivoire, Equatorial Guinea, Eswatini (former Swaziland), Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. The choice is based on data availability and consistency across the study period. A quota sampling technique is used to include only countries with sufficient observations for the key variables. This approach ensures analytical rigour while maintaining regional relevance.

3.2 Generalize Method of Moment (GMM)

The generalised method of moments (GMM) By optimizing an objective function that incorporated moment restriction, the parameter of interest was discovered. Consequently, there was no association between the lagged independent variable and error terms. Since it applied the optimal weighing matrices or used the initial step errors to generate the heteroscedasticity of consistent standard errors, two estimated steps were employed for all estimation (Blundell and Bond, 1998). Two specification tests, which evaluated the instrument's validity, were necessary for the GMM consistency estimation. If the null hypothesis was not rejected, then the instrument is valid and the models were appropriately described. Second, it is acceptable to reject the null hypothesis that there is no first-order serial correlation, but it is not appropriate to reject the null hypothesis that there is no second-order serial correlation.

The difference GMM started by estimating the model in differences and included lagged values of the explained and the explanatory variables as internal instruments. First, the model specification started-off with a specification on level equation such as:

$$Y_{it} = \lambda Y_{it-1} + \gamma X_{it} + \eta_{it} + \mu_{it} \quad (3.5)$$

Where Y (explained variable) is a function of its past values. The models added explanatory variables X which assumed to be weakly exogenous and firm-fixed effects. Second, after transforming the model 7 into the first difference, it becomes:

$$\Delta Y_{it} = \lambda \Delta Y_{it-1} + \gamma \Delta X_{it} + \Delta \mu_{it} \quad (3.6)$$

The transformation in model 7 into the first difference eliminated the firm-specific effects (η_i). However, there was a new endogeneity problem as a result of the correlation between the lagged explained variable (Y_{it-1}) and the different error term μ_{it} , as well as the possibility that some independent variables were endogenous. As such,

these problems were solved via higher-order lags of the explained variable such as Y_{it-2} as instruments for Y_{it-1} and higher-order lags for the explanatory variables such as X_{it-2} as instruments (Arellano and Bond, 1991).

$$RGDP_{ij,t} = \lambda RGDP_{ij,t-1} + \beta_0 + \beta_1 GEE_{ij,t} + \beta_2 GEH_{ij,t} + \beta_3 PCI_{ij,t} + \beta_4 GE_{ij,t} + \beta_5 EXR_{ij,t} + \phi_i + \alpha_t + \mu_{it} \quad (3.7)$$

RESULTS AND DISCUSSION OF FINDINGS

4.1 Descriptive statistics

Table 4.1: Descriptive Statistics

	LRGDP	LGEE	LGEH	LPCI	LGE	EXR
Mean	10.18078	0.363607	0.089561	3.111500	-0.116394	2.388089
Median	10.14172	0.510308	0.099685	3.011636	-0.052334	2.744642
Maximum	11.74087	0.957863	0.829585	4.191693	0.387431	4.363574
Minimum	9.035742	-5.396866	-1.047041	2.187324	-1.874754	0.461885
Std. Dev.	0.568959	0.818296	0.333283	0.389251	0.341763	0.897976
Skewness	0.462795	-5.801380	-0.433209	0.677430	-1.824277	-0.199877
Kurtosis	3.424659	39.47657	3.787803	3.015444	7.179185	2.356300
Jarque-Bera	16.42001	23198.43	21.71246	29.06819	487.3109	9.090767
Probability	0.000272	0.000000	0.000019	0.000000	0.000000	0.010616
Observations	418	418	418	418	418	418

Source: Researcher computation using Eviews 12.

The table 4.1 presents descriptive statistics of the variables employed in the analysis. The mean value of LRGDP is 10.181, with a standard deviation of 0.569, indicating moderate dispersion in real output across the sampled countries. LGEE has a mean of 0.364 but a very high standard deviation (0.818) and an extreme kurtosis of 39.48, reflecting substantial volatility and the presence of outliers in education expenditure across countries and years.

LGEH averages 0.090, LPCI averages 3.112, LGE (government effectiveness) has a negative mean of -0.116, consistent with the generally weak governance quality typically recorded for the sub-region, and EXR averages 2.388. All series are positively skewed except LGEE, LGE and EXR, which are negatively skewed, and all variables reject the null of normality under the Jarque-Bera test ($p < 0.05$), justifying the use of robust panel estimation techniques rather than methods that assume normality.

4.2 Panel unit root test

To avoid spurious regression and to determine the appropriate order of integration of the series prior to cointegration and dynamic panel estimation, three panel unit root tests were applied: the Levin, Lin and Chu (LLC) test, which assumes a common unit root process across cross-sections; the Im, Pesaran and Shin (IPS) test; and the ADF-Fisher Chi-square test, both of which assume an individual unit root process across cross-sections. Each series was tested at level and at first difference, with individual (cross-sectional) effects included as exogenous variables and lag length of 1.

Table 4.2 Panel unit root test

Variable		LLC		IPS		ADF - Fisher	
		Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
LRGDP	Level	-1.60302	0.0545	4.77398	1.0000	44.1919	0.9987
	1st Diff.	-6.65570	0.0000	-2.51051	0.0060	109.102	0.0077
LGEE	Level	-8.06250	0.0000	-1.60505	0.0542	100.702	0.0212
LGEH	Level	-5.24485	0.0000	-0.51551	0.3031	81.8308	0.3032
	1st Diff.	-9.29968	0.0000	-4.47065	0.0000	156.726	0.0000
LPCI	Level	-2.72282	0.0032	0.25339	0.6000	84.7451	0.2304
	1st Diff.	-13.5425	0.0000	-7.66303	0.0000	218.699	0.0000
LGE	Level	-3.04730	0.0012	1.13042	0.8709	58.7894	0.9282
	1st Diff.	-13.4154	0.0000	-4.49354	0.0000	141.504	0.0000
EXR	Level	0.77586	0.7811	3.39722	0.9997	67.3966	0.7490
	1st Diff.	-14.8430	0.0000	-6.85209	0.0000	216.384	0.0000

Source: Researcher computation using Eviews 12, the asterisks ** indicate rejection of the null hypothesis at 10% and 5% level respectively.

The table 4.2 presents the panel unit root test of Levin Lin and Chu (LLC), Im Pesaran and Shin (IPS) and ADF – Fisher. At level, the results are mixed across the three tests for most variables. For LRGDP, the LLC statistic (-1.603, $p = 0.0545$) is only weakly significant at the 10% level, while the IPS ($p = 1.0000$) and ADF-Fisher ($p = 0.9987$) statistics fail to reject the null of a unit root, indicating that LRGDP is non-stationary at level. LGEH, LPCI, LGE and EXR show the same pattern: the LLC test alone rejects the unit root null at level, while IPS and ADF-Fisher do not, so on the balance of evidence (majority-test rule) these series are treated as non-stationary in levels. LGEE is the one series for which two of the three tests (LLC, $p = 0.000$, and ADF-Fisher, $p = 0.0212$) reject the unit root null at level, with IPS only marginally short of the 5% threshold ($p = 0.0542$); LGEE can therefore reasonably be regarded as borderline stationary, i.e., $I(0)$.

At first difference, the null hypothesis of a unit root is rejected by all three tests (LLC, IPS and ADF-Fisher) for every series at the 1% level, confirming that LRGDP, LGEH, LPCI, LGE and EXR are integrated of order one, $I(1)$. Since the variables exhibit a mixture of $I(0)$ and $I(1)$ properties, none is integrated of order two or higher, which satisfies the pre-condition for testing for cointegration among the series and supports the use of a dynamic panel (system GMM) framework, which is robust to this mixed order of integration.

4.3 Panel Cointegration

Table 4.3: Kao Residual Cointegration Test

Kao Residual Cointegration Test	Value
ADF t-statistic	-2.585744
Probability	0.0049
Residual variance	0.000373
HAC variance	0.000666

Source: Researcher computation using E-views 12.

Table 4.3 presents the result of Kao residual panel cointegration test. The Kao ADF t-statistic is -2.586 with a probability value of 0.0049, which is statistically significant at the 1% level. The null hypothesis of no cointegration is therefore rejected, indicating that LR GDP, government expenditure on education, government expenditure on health, per capita income, government effectiveness and the exchange rate share a long-run equilibrium relationship. This confirms that although the variables are not stationary at level, they move together over time, and any short-run deviation from this long-run path is expected to be corrected, which justifies estimating a dynamic (error-correcting) model of economic growth for the panel.

4.4 System GMM Results

Table 4.4: System GMM Regression Results (Dependent Variable: LR GDP)

Variable	Coefficient	Std. Error	z	P> z
L.LR GDP	0.989284	0.008840	111.91	0.000
LGEE	0.004283	0.002423	1.77	0.077
LGEH	0.001075	0.012506	0.09	0.932
LGE	-0.036100	0.010505	-3.44	0.001
LPCI	-0.047468	0.013210	-3.59	0.000
EXR	0.6.91807	1.177606	0.59	0.554
Constant	0.270258	0.111389	2.43	0.015
Arellano-Bond Serial correlation test				
AR(1)				0.600
AR(2)				0.700
Sargan test				0.166

The overall model is highly significant, with a Wald chi2(15) statistic of 2.54×10^8 and a p-value of 0.000, confirming the joint significance of the regressors.

Lagged real GDP (L.LR GDP): The coefficient of 0.989 is positive and highly significant ($z = 111.91$, $p = 0.000$), indicating strong persistence in economic growth across Sub-Saharan African countries; a country's current level of output is overwhelmingly determined by its output in the preceding year. The coefficient being close to unity implies a slow speed of adjustment toward long-run equilibrium (about 1.1% per year), consistent with structural rigidities typical of the sub-region. Government expenditure on education (LGEE): The coefficient is 0.0043 and is positive, statistically significant only at the 10% level ($p = 0.077$). This suggests that, holding other factors constant, an increase in government spending on education is associated with positive effect on economic growth. Government expenditure on health (LGEH): The coefficient is 0.0011 and is statistically insignificant ($p = 0.932$). This indicates that health expenditure has no discernible short-to-medium-run effect on economic growth in the panel, which may reflect inefficiencies in health spending, weak execution of health budgets, or a lag between health investment and its productivity payoff that exceeds the study's time frame. Government effectiveness (LGE): The coefficient is -0.036 and is negative and statistically significant at the 1% level ($p = 0.001$). This result runs counter to theoretical expectation, which predicts that stronger governance and institutional quality should raise growth. Per capita income (LPCI): The coefficient is -0.047 and is negative and significant at the 1% level ($p = 0.000$). Exchange rate (EXR): The coefficient is (0.6.91807) and is statistically insignificant ($p = 0.554$), suggesting that exchange rate movements have no significant direct effect on economic growth in the panel over the review period.

Post-Estimation Diagnostics

The Arrelano and Bond serial correlation test shows that both AR (1) and AR (2) p-values' are greater 5%, this means that we cannot reject the null hypothesis and conclude that model has no serial correlation problem. In other word the model is free from serial correlation problem. Furthermore, the model passed normality test as the p-value is greater than 5%, the study concludes that the variables in the model are normally distributed. The Sargan test checks the validity of the instruments used in a GMM estimation. It tests the null hypothesis that the instruments are exogenous, meaning they are uncorrelated with the error term. This suggest that the instruments are reliable and valid.

4.5 Discussion of the Findings

On government expenditure on education (LGEE), the weak but positive effect on growth ($p = 0.077$) aligns directionally with a substantial part of the literature, even though the magnitude and significance differ. Akinlo and Oyeleke (2020) found that government expenditure on education, alongside other human capital indicators, positively and significantly affected growth in 36 SSA countries; Ogunleye, Owolabi, Sanyaolu and Lawal (2017) likewise reported a positive and statistically significant impact of government expenditure on education on Nigeria's economic growth; and Simeon (2024) found a positive correlation between education-related expenditure and human development outcomes. The weaker significance obtained in the present study, relative to these single-country or shorter-panel studies, is consistent with the explanation offered by Olusola (2016), who found that developing countries have tended to prioritise tertiary education over basic and secondary education, resulting in a weaker and less immediate translation of education spending into productivity and growth. It also supports the argument advanced by Muhammad, Abiodun and Manzoor (2018) that human capital exerts a positive effect on growth only where it is complemented by strong economic opportunities and high-quality institutions; given that government effectiveness is itself found to be a drag on growth in this study, the diminished potency of education spending is consistent with this institution-human capital complementarity thesis.

The finding that government expenditure on health (LGEH) has no significant effect on growth ($p = 0.932$) departs from Akinlo and Oyeleke (2020) and Ogunleye et al. (2017), both of whom found health expenditure to be a significant positive driver of growth. It is, however, consistent with Adekoya (2018), who found, using Granger causality within a VECM framework, that government spending on health did not exhibit either unidirectional or bidirectional causality with per capita income in Nigeria. The insignificance recorded here reinforces the recurring theme in the literature, also raised by Simeon (2024), that the productivity impact of health expenditure in SSA is undermined by weak execution of health budgets, corruption, and the long gestation period between health investment and measurable productivity gains, a concern that becomes more visible in a wider, more heterogeneous 38-country panel than in single-country time-series studies.

The negative and significant coefficient on government effectiveness (LGE) is the most theoretically striking result of the study, as it runs counter to the general expectation in the institutions-and-growth literature. Alemeu (2022) found that political institutions and human capital positively influence growth in SSA using the Arellano-Bond dynamic panel estimator, while Sajoh (2021) similarly found that weak institutions hinder economic performance in the region, implying that stronger institutions should raise growth, the opposite sign to what is obtained here. However, the result is not without support: Abdulwahab (2024), using fixed-effects regression on 47 SSA countries, found that weak institutional quality reduces the contribution of human capital development to growth, an interaction effect rather than a simple direct effect, which is consistent with the possibility that the growth effects of governance in SSA operate indirectly, through human capital, rather than directly and positively as a stand-alone determinant. Similarly, Ochi, Saidi and Labidi (2024) demonstrated a nonlinear, threshold-dependent relationship between governance quality and poverty outcomes across South Asian and SSA countries, only turning favourable once governance quality surpasses a specific threshold; since average government effectiveness in the sample is negative (mean = -0.116, Table 4.1), most SSA countries in this study likely sit below the threshold at which governance quality becomes growth-enhancing, which is consistent with a negative average effect being recorded here. The result may also reflect the reform-timing/fiscal-consolidation effect discussed in Section 4.4, whereby governance improvements have often coincided with adjustment

programmes that depress short-run output even where they may support growth in the long run, as well as the possibility of reverse causality, whereby weaker growth performance itself prompts governance reform.

CONCLUSION AND RECOMMENDATIONS

The study investigated the dynamic impact of government expenditure on education, government expenditure on health, per capita income and government effectiveness on economic growth in 38 Sub-Saharan African countries over the period 2014-2024. The study used panel unit root tests, the Kao residual cointegration test and system GMM dynamic panel estimator. The results show that the study variables are integrated of mixed order, $I(0)$ and $I(1)$, but are cointegrated, confirming a genuine long-run equilibrium relationship rather than a spurious one. Economic growth in the sub-region was found to be highly persistent, with a country's current output overwhelmingly conditioned by its past output, implying a slow speed of adjustment toward long-run equilibrium and pointing to structural rigidities within SSA economies. Government expenditure on education was found to exert a weak, marginally positive effect on growth, while government expenditure on health showed no statistically significant effect. Government effectiveness and per capita income were both negatively and significantly associated with growth in the dynamic specification, results attributable, respectively, to the possibility that most SSA countries have not yet crossed the governance threshold at which institutional quality becomes growth-enhancing.

The study concludes that human capital development, as currently financed and delivered in Sub-Saharan Africa, has not yet translated into a strong, statistically robust driver of economic growth, and that this weak translation is closely tied to the quality of governance in the sub-region. In other words, spending on education and health cannot be expected to deliver their full growth dividend in an environment where institutional quality remains, on average, weak; human capital and institutional quality function as complementary rather than independent determinants of growth in SSA, consistent with the theoretical proposition of Romer (1990) that growth is jointly determined by capital, labour and human capital operating within a given institutional and technological environment. The study recommends that Sub-Saharan African governments should increase budgetary allocation to education, with priority given to basic, secondary and technical education that build productive skills rather than a disproportionate focus on tertiary education, and should encourage public-private partnerships to complement government funding and improve delivery efficiency, so that the currently weak effect of education spending on growth can be strengthened over time. Given that health expenditure showed no significant effect on growth, governments and development partners should prioritise strengthening budget execution, transparency and monitoring in the health sector - rather than simply increasing nominal health budgets - to close the gap between health spending and measurable productivity gains.

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