



The Role of Educational Investment in Promoting Economic Growth across Sub-Saharan African Economies

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Abstract	Original Research Article
This study investigates the effects of education spending and institutional conditions on economic growth in 41 countries in Sub Saharan Africa between 2000 and 2024, using the Difference Generalized Method of Moments (Difference GMM) estimation technique. The Difference GMM approach controls for endogeneity, unobservables, and country-specific effects, and yields consistent and robust parameter estimation. The empirical findings clearly show that economic growth is positively and significantly affected by education spending, thus corroborating the human capital hypothesis that education stimulates productivity, innovation, and long-term economic growth. Contrary to this, institutional quality is found to be inversely related with economic growth, implying that poor governance, institutional weaknesses and the lack of effectiveness in policy implementation are detrimental to the development effects of public spending. The results also suggest a positive and significant impact of trade openness on economic growth, indicating the need for regional and international economic integration, and gross fixed capital formation and labour force growth have positive and negative effects respectively, depending on the efficiency of investment and the quality of human capital. It is concluded that education investments must be continued, institutional reforms must be enhanced, and policies must be put in place to support the integration into trade to stimulate inclusive, resilient and sustainable economic growth in Sub-Saharan Africa. Keywords: Education Expenditure, Institutional Quality, Economic Growth, Difference GMM, Sub-Saharan Africa, Human Capital.	

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1. INTRODUCTION

Education has always been regarded as one of the most significant factors of economic development, as it is both a catalyst and a result of economic development. Education investments boost human capital, increase labour productivity, foster innovation, and boost a country's growth potential

(Barro & Lee, 2018). Education, in Africa, especially in the developing regions of Sub Saharan Africa (SSA) is not only a social requirement, but also plays an important role as a catalyst in sustainable economic development because of the persistent structural constraints, poverty and significant income inequality in those regions. Raising levels of public sector spending on education can help build a skilled



workforce, draw investment from abroad and domestic investors, ease the process of technological adoption, and facilitate structural transformation (Hanushek & Woessmann, 2020). Nevertheless, the findings from the empirical studies on the effectiveness of education expenditure for economic growth in Sub-Saharan Africa are yet to reach a consensus with some studies yielding positive outcomes and others negative and even paradoxical. In the last 20 years, governments in Sub Saharan Africa (SSA) have invested substantially more in education and other areas of development, poverty alleviation and human capital development. The World Bank (2024) estimates that public spending on education in the region averaged about 4.5% of GDP over the last two decades (2000–2024), with some countries like the Republic of Botswana, Kenya, and South Africa spending more than 6% of GDP in education. Yet, the region still faces ongoing problems such as low educational standards, lack of labour market absorption, high youth unemployment and relatively sluggish economic growth compared to other developing regions (UNESCO, 2023). This seeming paradox implies that while a higher level of spending on education does not necessarily lead to better economic performance. Instead, the efficiency, quality, and equitable distribution of educational resources are key factors in the success of sustainable economic growth from public education investment (Adekoya & Adewale, 2022).

Endogenous growth theory is the main economic theory to explain the theoretical relationship between education expenditure and economic growth, where human capital accumulation is seen as one of the important components in long-term economic growth. Lucas (1988) and Romer (1990) maintain that investment in education increases the productivity of workers, creates innovation and enables technological progress, leading to continued economic growth in the long term. In several Sub-Saharan African countries, however, the benefits of increased spending on education that is expected are undermined by governance problems, institutional inefficiencies, corruption and poor public financial management systems (PFMS) (Anyanwu &

Erhijakpor, 2017). Lack of accountability in budget implementation, poor allocation of public funds, poor educational infrastructure and limited policy coordination are some of the common factors that impact the efficiency of education spending. As a result, there have been countries that have seen strong growth benefits from education investment while others have not, or not sufficiently, (Ogunleye & Ayinde, 2021). There has also been a significant difference in economic performance among the sub-Saharan countries over the period of study. Some countries, including Rwanda, Ethiopia, and Ghana, have seen average annual GDP growth rates above 5% since then, whereas South Sudan and Zimbabwe have suffered from long periods of economic stagnation and falling GDP as a result of political unrest, armed conflict, macroeconomic imbalances, and policy incoherence (IMF, 2024). Such cross-country variations highlight the need to carry out a detailed regional analysis to identify the role played by differences in institutional effectiveness and education spending on regional economic growth. Moreover, as enrolments in the secondary and tertiary education sectors have been growing across the region, there is a need to evaluate the economic impact of the increase in investment in education (World Bank, 2024).

There has been no uniformity in the results of empirical research on the relationship between education spending and economic growth in developing countries, which may be due to methodological shortcomings. However, conventional estimation methods, such as Ordinary Least Squares (OLS) and Fixed Effects (FE), may not be suitable for coping with endogeneity due to reverse causality in which higher economic growth is likely to be accompanied by more expenditure on education by the government (Samargandi & Fidrmuc, 2020). To address these restrictions, this paper uses the Difference Generalized Method of Moments (Difference GMM) estimator proposed by Arellano and Bond (1991). The Difference GMM offers a good tool for dealing with dynamic panel data, endogeneity and control for unobserved country-specific effects, and reduces possible

autocorrelation, and thus yields more reliable and consistent parameter estimates. In this study, therefore, the effect of education spending on economic growth in Sub-Saharan Africa is investigated using the Difference GMM estimation technique. The empirical model also includes gross fixed capital formation, growth in the labour force, trade openness, inflation, and institutional quality as control variables that give a more complete picture of the factors that affect economic growth. The study also leverages the latest panel data from the period 2000–2024, which captures key policy changes and development initiatives such as the Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs) and the socioeconomic impact of the COVID-19 pandemic on education financing and economic performance in the region (UNDP, 2023).

This study makes significant contributions to the literature in three major ways. It offers fresh empirical data on the education-growth link in Sub-Saharan Africa, based on 25 years of recent panel data. Second, it uses the Difference GMM estimator that explicitly recognizes the dynamic nature of the education expenditure–growth relationship, and that has been used less than other estimates in the literature so far do. Third, the study uses institutional quality as part of the empirical set-up to explore how governance conditions impact on the effectiveness of education spending in stimulating economic growth, which builds on existing studies like Bokpin (2020) and Ahmed et al. (2021). The results of this study will have policy implications for governments, development partners and international organisations interested in improving educational outcomes and enhancing sustainable economic development in Sub-Saharan Africa. The study highlights that good governance, institutional effectiveness, transparency and accountability in the use of education funds are as important as quantity of public funds spent on the education sector for the effectiveness of expenditure. It is therefore crucial to build the governance capacity, increase the effectiveness of public spending and ensure that educational investments are oriented towards labour market needs in order to turn

education investments into sustained economic growth and inclusive development in the region.

2. LITERATURE REVIEW

The empirical studies about the connection between education spending and economic growth have yielded mixed and context dependent results between countries and regions. Despite the large amount of literature exploring the role of public investment in education for promoting economic growth due to human capital accumulation, productivity gains, and technological advances, other studies call into question the linkage between education expenditure and economic growth, arguing that it is largely driven by institutional quality, governance efficiency, and effective use of education resources. The mixed results from the empirical studies are due to variations in the econometric techniques, sample populations, time horizons and the structural aspects of the economies examined (Adekoya & Adewale, 2022; Anyanwu & Erhijakpor, 2017). The education–growth relationship is theoretically grounded in the human capital and endogenous growth theories. Barro (2013) has shown that Education has a significant role in economic development because it enhances labour productivity, innovation and technology development. The study was also conducted on a panel of one hundred countries revealing a positive relationship between education and long run economic growth. Similarly, Mankiw, Romer and Weil (1992) found human capital accumulation to be a key factor in determining steady state economic growth in an augmented Solow growth model. However, other research has suggested that boosting education spending without improving the quality of education, institutional capacity, and effective governance does not necessarily lead to greater economic growth (Hanushek & Woessmann, 2020).

There are several empirical studies that document the fact that the growth impact of education spending is mostly long-term but rarely immediate. Using cointegration analysis of developing countries, Self and Grabowski (2004) found that spending on primary education had a significant positive effect on long-term economic growth, while tertiary education

expenditure had lower impact. In the same vein, Dauda (2010) using ARDL method for Nigeria, has also fixed a long-run dynamic relationship between education expenditure and economic growth. This positive effect of the use of education in the long-run GDP growth was statistically not significant in the short-run, meaning that investments in education take a long time to show measurable economic returns. The overall picture from Sub-Saharan Africa is that while there is a general consensus that education expenditure is important for economic growth, the magnitude of the relationship varies by country. Anyanwu and Erhijakpor (2017) analyzed the effect of government investment in education on economic growth for a sample of 45 countries in Africa and concluded that government spending on education is a strong driver of economic growth, especially in countries with relatively high levels of school enrollment and human capital development. On the other hand, Ogunleye and Ayinde (2021) using this PPCM approach for 30 Sub Saharan African countries found that investing in education has a positive effect on economic growth only in countries with good governance framework. Education spending had small effects on growth in countries with weak institutions, corruption and poor public financial management, underscoring the need for good institutions in achieving positive impacts on educational investment.

Dynamic panel estimation methods have been used more and more frequently in recent studies to deal with endogeneity and unobserved heterogeneity. Amegashie et al. (2022) in their study on the effect of expenditure on education on the economic growth of 40 Sub-Saharan African countries from 1995 to 2020 used Difference Generalized Method of Moments (Difference GMM) estimator and found that education expenditure has a positive and statistically significant impact on economic growth, especially in the presence of macroeconomic stability and prudent fiscal management. Ngépah and Mbah (2020) however employed the system GMM estimator in forty-four African countries and determined that education expenditure is just not enough to support economic growth if left without support from enhancement of labour productivity, innovation capacity and institutional efficiency.

They conclude that the inefficiency of public sectors and poor management of government results in a decrease in the productivity of the educational investment. A country-specific study also demonstrates the mixed effects of the education expenditure–growth relationship. Omodero (2019) applied the Vector Error Correction Model (VECM) to Nigeria and reported positive long-run effect of education expenditure on economic growth while negatively impacting upon its short-run economic growth due to fiscal adjustment pressures and inefficient management of expenditure. Also, Okafor and Adeleye (2021) found that investment in education has a positive impact on economic growth in countries with high labour market absorption, but had a lower impact in countries where unemployment and skill mismatch are prevalent using the Difference GMM estimator across 10 West African countries.

The same observations are offered on the basis of evidence from other parts of the developing world. Lee and Kim (2020), employed the Difference and System GMM methods with seventy-five developing nations, concluded that the education expenditure has a positive impact on economic growth especially in low and middle-income countries. The study also found, however, that there are diminishing returns at public spending, once it becomes too large to be efficiently realized by the institutional capacity. Similarly, Alshahrani and Alsadiq (2021) found that while spending on education in the short run can boost economic growth, if the government spends too heavily on education, it could lead to a decline in long-term economic growth by diverting resources away from other sectors with higher productivity. Existing empirical evidence at the country-level within Sub-Saharan Africa also suggests that the impact of education spending is influenced by education quality and labour market conditions. For Ghana, Banya (2022) observed that higher education spending had a positive impact on economic growth; it resulted in higher labour productivity and employment rates. However, Lado and Odongo (2023) found that there was little increase in learning outcomes in Uganda despite significant investments in education due to inefficiencies in educational service delivery and poor learning outcomes. In

addition, Mwangi and Ochieng (2024) established that expenditure on secondary and tertiary education in Kenya had more positive economic growth impacts than primary education expenditure, given the need for skilled human capital in a knowledge-based economy.

The moderating effect of institutional quality has also received a considerable amount of empirical interest. In a panel data analysis of education spending in forty-two African countries over the period 2000–2019, Ahmed et al. (2021) showed that governance quality positively affects the effectiveness of education spending, ensuring that funds are used efficiently, transparently, and with accountability. Similarly, Asongu and Odhiambo (2022) showed that corruption, poor institutions and weak governance significantly diminish the productivity of education spending, and hence its role in economic growth. The overall results imply that institutional quality is a significant channel of impact of education expenditure on economic performance. The overall empirical literature shows that the link between education spending and economic growth is complex and dynamic and largely sensitive to institutional, macroeconomic and structural conditions. While the majority of studies document positive long run results, findings are still mixed in the short run due to variations in governance quality, short-run efficiencies in public expenditure and time to economic returns from educational investments. Moreover, the different methodological approaches, such as static panel models, fixed-effects estimators, panel cointegration methods and System GMM, have added to the mixed results found in the literature.

While there is growing empirical evidence, there are still key research gaps. First, few studies have taken into account the education expenditure–economic growth nexus using recent data that reflect the period following the COVID-19 and associated fiscal adjustments in Sub-Saharan Africa. Second, while dynamic panel estimators have gained considerable interest in recent years, a relatively small amount of attention has been paid to the Difference GMM estimator which can be used to overcome the related endogeneity, country-specific heterogeneity and reverse causality issues. Third, the previous studies

have focused only partly on the combined effect of the quality of institutions and important macroeconomic variables on the impact of education spending on economic growth. In this context, this study uses the Difference Generalized Method of Moments (Difference GMM) econometrician to examine the effect of education spending on economic growth in forty-one Sub Saharan African countries for the period 2000-2024. The study offers fresh and policy-relevant evidence on the dynamic linkage between education spending and economic growth as well as tackles important methodological and empirical gaps in the existing literature by introducing the institutional quality as another macroeconomic control variable.

2.1 Conceptual Framework

This study's conceptual framework provides a theoretical connection between education spending and economic growth in Sub-Saharan African countries. It assumes that the investment on education is the prime factor behind human capital accumulation and hence enhances the educational access, the literacy rate, skills formation, and the labor productivity (Lucas, 1988; Barro, 2013). Improved public education spending improves the quality and availability of educational services, and thus, the ability of the population to become a more skilled, innovative, and productive labor force that can help drive technological progress and sustainable economic growth (Hanushek & Woessmann, 2020).

The process of human capital accumulation and spreading of technological innovation in turn increase production efficiency, drive innovation, increase competitiveness, and foster long-term economic development (Romer, 1990). However, the impact of this transmission mechanism is heavily abated by the state of institutions and the macroeconomic context. Good institutional performance encourages transparency, accountability, good governance and effective use of public education resources; this helps enhance the positive effects of education spending on economic growth (Acemoglu & Robinson, 2012). Similarly, macroeconomic stability in terms of low inflation, good fiscal policy and stability of economic policies

provides an enabling framework for the productive use of human capital and continued economic growth.

The conceptual framework is thus that education spending affects economic growth through the generation of human capital and technological innovation; institutional quality and macroeconomic

stability, in turn, amplify or dampen the impact of education spending. It serves as a basis for the empirical study and aids the use of the Difference Generalized Method of Moments (Difference GMM) estimator to analyze the dynamic relationship between education expenditure and economic growth in Sub-Saharan Africa.

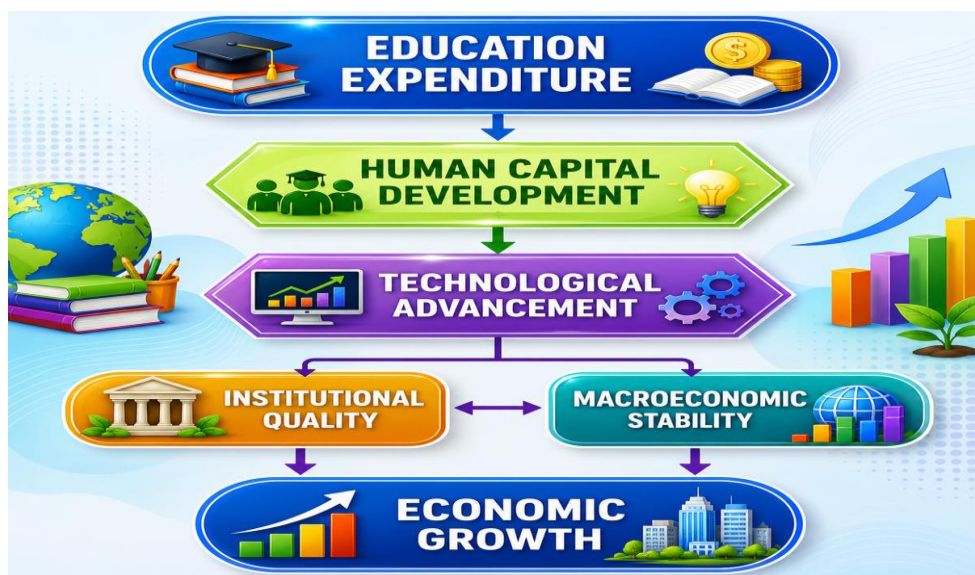


Figure 2.1: Conceptual Framework Illustrating the Relationship between Education Expenditure and Economic Growth

Source: Author's Conceptualization (2026), Adopted from Acemoglu and Robinson (2012)

3. METHODOLOGY

The purpose of this study is to examine the effect of education spending on economic growth in Sub Saharan African (SSA) nations during 2000-2024 with a specific attention on the role of institutional quality in the relationship. The sample consists of 41 SSA countries which were chosen for their data availability and to represent regions in West, East, Central and Southern Africa. The study is designed

as quantitative with a dynamic panel data estimation method to explore in both long and short-run relationships. Data on economic growth, expenditure on education and control variables were obtained from the World Development Indicators (WDI), UNESCO Institute for Statistics (UIS) and World Governance Indicators (WGI) databases, respectively. The dataset is balanced which means that there are equal numbers of observations for all variables for the study period (2000 to 2024).

Table 1: Variable Definition and Sources

Variable	Definition	Source
Economic Growth (GDP)	Annual growth rate of real GDP per capita, reflecting economic performance.	World Development Indicators (WDI)
Education Expenditure (EDUEXP)	Total government expenditure on education as a percentage of GDP.	UNESCO Institute for Statistics (UIS), WDI
Institutional Quality (IQ)	Composite index of governance effectiveness, rule of law, and control of corruption.	World Governance Indicators (WGI)
Gross Fixed Capital Formation (GFCF)	Investment proxy measured as a percentage of GDP.	World Development Indicators (WDI)
Trade Openness (TRADE)	Sum of exports and imports as a percentage of GDP.	World Development Indicators (WDI)
Labor Force Participation (LABF)	Percentage of the working-age population actively engaged in the labor market.	World Development Indicators (WDI)

3.1 Model Specification

The empirical model is adapted from Barro (1991), Gyimah-Brempong et al. (2006), and Hanushek and Woessmann (2020), who examined the education–growth relationship using dynamic panel frameworks. The functional relationship is expressed as:

$$GDP_{it} = f(EDUEXP_{it}, IQ_{it}, GFCF_{it}, TRADE_{it}, LABF_{it}) \dots \dots \dots (equ 1)$$

The econometric specification is formulated as:

$$GDP_{it} = \beta_0 + \beta_1 EDUEXP_{it} + \beta_2 IQ_{it} + \beta_3 GFCF_{it} + \beta_4 TRADE_{it} + \beta_5 LABF_{it} + u_{it} \dots \dots \dots (equ 2)$$

Where, GDP_{it} is the economic growth in country i at time, $EDUEXP_{it}$ is the education expenditure (% of GDP), IQ_{it} is the institutional quality index, $GFCF_{it}$ gross fixed capital formation (% of GDP), $TRADE_{it}$ is the trade openness, and $LABF_{it}$ is the labor force participation. u_{it} id the error term

3.2 Estimation Technique

This study uses Arellano and Bond (1991) Difference Generalized Method of Moments

(Difference GMM) estimator. The choice is made because this approach is robust to the presence of endogeneity among the regressors and the lagged dependent variable being correlated with the error term, which is common with dynamic panel models. In Difference GMM, the variables are taken as differenced and the instruments are lagged levels for endogenous variables, in order to remove unobserved country-specific effects. Prior to estimation, diagnostic tests are employed such as Cross-Sectional Dependence Test (CSDT) by Pesaran (2004); and the Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) unit root tests to test for cross-sectional dependence and stationarity, respectively. The Hansen and Sargan tests are used for instrument validity and the Arellano-Bond AR(1) and AR(2) tests for serial correlation of the residuals.

The Difference GMM model is expressed as:

$$\Delta GDP_{it} = \alpha \Delta GDP_{it-1} + \beta_1 \Delta EDUEXP_{it} + \beta_2 \Delta IQ_{it} + \beta_3 \Delta GFCF_{it} + \beta_4 \Delta TRADE_{it} + \beta_5 \Delta LABF_{it} + \Delta e_{it} \dots \dots \dots (equ 3)$$

In this way, both endogeneity and omitted variable bias, and reverse causality between education expenditure and economic growth are overcome and

estimates are consistent and non-biased. This approach will yield results focusing on direct and indirect effects of the sub-sectoral spendings on

economic growth, including the influence of the quality of institutions, investments, and openness of trade in Sub-Saharan Africa.

4. RESULT AND DISCUSSION

4.1 Pre-estimation Test

Table 4.1 Summary Statistics

VARIABLE	Mean	Std.Dev	Max	Min
GDP	2.34766	4.99778	14.907	-7.7667
EDUEXP	29.33	12.86	75.66	0.734
IQ	1.615	0.29	1.93	-0.56
GFCF	109.54	36.78	205.38	32.33
TRADE	1690.98	4.98	5101.9	253.38
LABF	217.69	161.76	709.79	0.00

Source: Generated using EVIEWS 12

Table 4.1 provides summary statistics of the variables considered in the impacts of education spending on economic growth of the Sub-Saharan African countries during the period of 2000-2024. On average, GDP in the countries in this region is projected to grow by a modest 2.35%, with a large variance of 4.99, suggesting that there is a high degree of variability in economic performance across the countries. There is a significant difference in government spending on education as indicated by the variance of education expenditure (EDUEXP) expressed as a percentage of the GDP, ranging from 0.73 % to 75.66 % with a mean of 29.33 %.

Institutional quality (IQ) ranges from –0.56 to 1.93, is generally quite high and has a mean score of 1.62, with some countries having strong related governance features while others have weak institutional features. The gross investment in fixed assets (gross fixed capital formation) has an average of 109.54%, indicating medium levels of investment. Trade openness (TRADE) and the share of labor force in workforce (LABF) exhibit a high mean values and standard deviation values ranging across wide dispersion, which mean that there are significant differences in economic integration and workforce engagement in SSA economies.

Table 4.2 Cross Sectional Dependence Test

Variables	Breusch Pagan LM	Pesaran scaled LM	Bias-corrected scaled LM	Pesaran CD
GDP	7908.11 (0.000) ***	192.15 (0.000) ***	192.20 (0.000) ***	71.87 (0.000) ***
EDUEXP	3474 (0.000) ***	73.917 (0.000) ***	72.967 (0.000) ***	6.9132 (0.000) ***
IQ	3944.491 (0.000) ***	86.447 (0.9760) ***	85.497 (0.000) ***	11.874 (0.000) ***
GFCF	10199.9 (0.000) ***	253.27 (0.000) ***	252.323 (0.000) ***	93.340 (0.000) ***
TRADE	9984.8 (0.000) ***	247.53 (0.000) ***	267.588 (0.000) ***	98.393 (0.000) ***
LABF	7681.51 (0.000) ***	1861.11 (0.000) ***	185.16 (0.000) ***	70.739 (0.000) ***

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Source: Generated using EVIEWS 12

Table 4.2 shows the results of the Breusch-Pagan LM, Pesaran scaled LM, Bias-corrected scaled LM and Pesaran CD statistics for all variables of the model. From the results, it can be seen that all variables used, GDP, EDUEXP, IQ, GFCF, TRADE and LABF are statistically significant at 1% level of significance as their p value is 0.000. It means that there is a high level of cross sectional dependence between the panel units, such that an economic and policy change in one Sub Sahara African country may impact on another county.

This dependency can occur due to the continental integration, trade patterns, and common socio-economic issues. While the results of the four tests are significant, they are substantial enough to allow for the use of econometric methods that explicitly recognise inter-country dependence, including the Difference GMM technique to account for correlated country specific shocks. However, neglecting this dependence relationship may result in under- or overestimation of education expenditure and economic growth in the study.

Table 4.3 Panel Unit Root Test

	Levin, Lin and Chu (LLC) Test		Im, Pesaran and Shin (IPS) Test		Order of integration
Variables	Statistics	Number of lag	Statistics	Number of lag	
GDP	-7.5988***	1	-1.401**	1	I (0)

EDUEXP	-9.238***	1	-11.0547**	1	I (1)
IQ	-3.043***	1	-10.334*	1	I (1)
GFCF	-7.3376***	1	-7.6344***	1	I (1)
TRADE	-10.696***	1	-10.396***	1	I (1)
LABF	-10.153***	1	-6.1348***	1	I (0)

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Source: Generated using EVIEWS 12

To check the stationarity of the variables, the panel unit root tests performed in this chapter on the basis of the Levin, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS) methods are presented in Table 4.3. GDP and LABF turn out to be stationary at the level of I(0) as the test statistics show significance at the 1% and 5% level for the GDP and LABF respectively. That

means that these variables are not characterized by unit roots, or by instability over time. EDUEXP, IQ, GFCF and TRADE, on the other hand, remain stationary after the first difference (I(1)), which means they have been integrated once. This indicates that these variables have time dependent changes but when differenced are stable.

4.2 Impact of education expenditure on economic growth in Sub-Saharan African countries.

Table 4.5 Education expenditure and economic growth in Sub-Saharan African countries. (Difference GMM). Dependent Variable: GDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP (-1)	0.788	0.045576	17.302	0.0000
EDUEXP	0.033	0.017294	7.236	0.0066
IQ	-0.050	0.004236	-12.75	0.0003
GFCF	-0.26	0.082255	-3.187	0.0107
TRADE	0.201	0.073046	2.752	0.0093
LABF	-0.530	0.050285	-10.55	0.0000
Countries				41
Observations				1025
DIAGNOSTIC TEST				
Sergan Test		36.934	P-value	0.251
Arrelano-Bond AR (2) Test		0.523	p-value	0.192

Source: Generated Using EVIEWS 12

Table 4.5 shows the Difference Generalized Method of Moments (GMM) estimation results of the relationship between education expenditure and economic growth in Sub-Saharan African countries with GDP as the dependent variable. Both diagnostic tests, Sargan ($p = 0.251$) and the Arellano-Bond AR(2) ($p = 0.192$), suggest that the model is adequate and does not suffer from over-identification and second order serial correlation issues, which would make the GMM estimates reliable.

The coefficient for lagged GDP ($GDP(-1)$) is 0.788 and significant at the 1% level, suggesting a strong persistence of GDP growth in Sub-Saharan Africa. That is, historical growth in GDP have positive impact on the current economic growth in the region, indicating that the region's economic growth is cumulative.

This coefficient of education expenditure (EDUEXP) is 0.033 and statistically significant at the 1% level indicating that there is a positive positive impact between increases in public education spending and economic growth that is statistically significant. This result corroborates with the human capital theory that states that education increases the productivity of the working groups, its capacity to innovate and to be competitive in the long run. It suggests that an extra percentage on education expenditure results in corresponding positive GDP contribution for the region.

However, institutional quality (IQ) is negatively and significantly related with the indicator (-0.050). This surprising finding suggests that it is difficult for weak or inadequate institutions to support the benefits of policy actions, such as investment in education. The potential of public investments to boost growth could be constrained due to corruption, poor governance and institutional inefficiencies found in some regions of Sub-Saharan Africa.

In addition, the gross fixed capital formation (GFCF), which refers to the physical capital accumulation has a significant negative correlation of -0.26 at 5% with GDP. This indicates that maybe capital investment in the region is not efficiently used, perhaps due to mismanagement or insufficient infrastructure, or consumer oriented investment

dominates productive investments.

The trade openness (TRADE) variable is positive and significant (0.201) which suggests an increase in opening up to the international trade supports economic growth. This emphasizes the need to diversify exports, form regional trading partnerships and promote liberalisation of markets to improve economic performance.

Therefore, GDP is negatively affected (-0.530) by the labor force (LABF), which suggests that simply more labor will not boost growth, unless increased technology and job creation can be expected to turn up to match. This highlights the need to invest in education and skills development in order to guarantee that labour is productive in the economy.

4.3 Discussion

The findings of the study reveal important insights into the relationship between education expenditure and economic growth in Sub-Saharan African countries. The findings highlight continued economic growth, the positive impact of investment in the education system and liberalizing trade, and constraint from fewer but stronger institutional factors, less efficient investment in capital, and less effective use of labor. Taken together the results provide an indication of structural dynamics, which drive development trends throughout the region, and how important human capital investment and institutional reform are to meeting the goal of sustainable growth. The positive effects of past economic performance on the current level of GDP implies a path-dependency in growth of GDP in the region of Sub-Saharan Africa such that countries that experience growth with a stable trajectory tend to sustain and reinforce their growth over time. It is interesting to observe that the finding is consistent with the idea of 'growth persistence', which is also a central idea in endogenous growth theories that stress learning, investment and continuity of policies. The importance of past economic performances on current outcomes is partly due to the intertwinement of these performances in current expectations, investment, and the building of productive capacities, as noted by Barro (2019). This is

consistent with the findings of Aghion and Howitt (2018) who noted that stable high economic growth in less-developed regions is greatly effected by the stability and functionality of previous economic systems.

The positive association of costs of education and economic growth aligns with human capital theory, which sees education as an important source of productivity and innovation. By helping to improve skills, education promotes and supports the implementation of technologies and boosts institutional capacity, all of which can foster economic progress. The finding is in line with that of Gyimah-Brempong and Wilson (2017) which reported that expenditure on education is significant and beneficial to the economic performance of African countries because of its capacity to boost labour productivity and income levels. Similarly, another study conducted by Baldacci et al. (2008) revealed that higher spending on education results in greater growth in developing countries as it increases not only the number of study only, but also the quality of human resources. Other research however, has challenged the idea that spending on education necessarily leads to growth, especially when the funds are poorly directed and are managed inefficiently, as often happens in some Sub-Saharan contexts, e.g. Benos and Zotou (2017). The general negative relationship between institutional quality and growth, as found in this study, is indicative that poor governance, corruption, and political instability can have adverse impacts on the potential effect of investing in education on growth and other growth-enhancing policies. Institutions are everywhere and have a crucial role in shaping resource allocation and measuring development impact of investments. The result is in line with that of Acemoglu and Robinson (2012) who suggested that extractive institutions limit economic development through resource misallocation and the disincentive of productive investment. Likewise, Mauro (2019) noted that corruption and inefficiency of public processes affect the growth potential of public spending, particularly in education and infrastructure.

The negative effect of gross fixed capital formation on growth in the result could be a reflection of the fact that capital accumulation does not necessarily

lead to productive output by resulting from inefficiencies in capital management. These inefficiencies may be due to corruption, flaws in book-keeping, and lack of maintenance of the physical equipment. Similar conclusions are drawn by Devarajan, Swaroop, and Zou (1996) which identified mis-allocation and governance weaknesses in many developing countries as major sources of ineffectiveness in public capital spending. However, other studies, such as that of Ndikumana (2017), have demonstrated that infrastructure and technology investments with focused direction, if underpinned by good institutions, can generate substantial growth. In addition, openness to trade has been shown to have a positive effect on economic growth, which stresses the need for regional connections, export diversification and competitive trade policies. This suggests that an open-economy grows faster as Sachs and Warner (1997) have shown, because of access to world markets, knowledge spillovers and investment opportunities. Likewise, Were (2015) found that trade openness is positively associated with industrial growth and industrial productivity in Sub-Saharan Africa (SSA) provided it is backed by good performance of macro-economic policies.

However, as labor force growth comes at a cost to economic performance, a growing labor force is a constraint on growth if there is a weak relationship between it and job creation, or if there is no development of skills. This discovery reinforces the Todaro and Smith (2020) argument that with high population growth rates and high rates of labour force participation in many African countries, there is a problem of low productivity and underemployment. On the other hand, research findings like those of Hanushek and Woessmann (2012) indicate a positive relationship between labour and growth when implying that this resource must be backed by education and vocational training.

5. CONCLUSION AND RECOMMENDATIONS

The aim of this study was to investigate the effects of education expenditure on economic growth in Sub-Saharan African (SSA) countries during the period

2000-2024 while taking into consideration the effect of institutional quality, capital formation, trade openness and labor force participation. Results show that budget allocation to education is significant for improving economic growth, thus highlighting the importance of investing in human capital for creating productivity, innovation and competitiveness throughout the region. The findings do, however, suggest that low institutional performance and sub-optimal investments in capital-related items limit the potential of education spending. Likewise, although greater openness to trade is beneficial for economic outcomes, more labor in the market, but only if coupled with the rise in the relevant skilled labor force or job creation, is detrimental to growth.

Despite economic growth being ongoing, there is still a need for continued policy action and stable macroeconomic conditions for continued economic growth. However, structural issues like low levels of productivity in investments, inefficient governance systems and corruption remain to be the challenges that block the transformation of expenditure into sustainable economic growth.

Several policy recommendations are suggested, based on these findings.

- i. First of all, SSA governments need to allocate more resources to education and allocate these resources properly towards quality improvements, teacher training, and skill-building education that caters to the needs of the labour market.
- ii. Secondly, the need for institutional reforms to deal with better transparency, accountability and efficiency in public expenditure, and improve the efficiency of investment in education. Simmering governance systems will boost the resource allocation to productive activities creating growth.
- iii. Third, there is a need for policy support to diversify trade and foster regional integration, which will broaden markets and stimulate innovation-based growth.
- iv. Fourth, job creation and skill training in the labor market and entrepreneurship is needed to make the most of the demographic dividend through labor policies. Finally, investment funds need to focus on

supporting education and industrial productivity through investments in infrastructure and technologies.

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