The link between human capital formation and economic growth in East Africa

Abstract

The East African Community members' strategy is focused on achieving smart, sustainable, and inclusive economic growth. This cannot be achieved without the major contribution of skills, knowledge, and innovation, commonly known as human capital formation. It is difficult to believe that these goals could be realized without a good education and training system, training development, better health sector infrastructure, a large diffusion of knowledge in the manufacturing and service sector, and a great effort to create a research-intensive agricultural economy. Most East African economies lack a number of these growth pre-take-off conditions. Employing neoclassical augmented Solow growth theory as the theoretical framework and using panel methodology, the study investigated the role of human capital resources as a factor in stimulating output growth in East Africa. The findings showed that human capital formation was positive and significant to economic growth in East Africa. This study argues that policies and strategies that advocate for accelerated public investment in human capital development will promote productivity growth and further stimulate resilient economic growth in the East African economies.

Keywords: Human capital, economic growth, education, health, panel

JEL Classification: J00, J24

1. Introduction

Economic theory does not automatically generate strong conclusions about the role of human capital formation in explaining output growth and factor productivity. Indeed, most economic literature would agree that there are circumstances in which better-developed human capital infrastructure would translate to sustainable development and resilience growth (Mitchell, 2005). While others argue human capital accumulation has a minimal role in explaining output growth in developing economies. Human capital formation is the stock of competencies, knowledge, and social and personality attributes, including creativity, embodied in the ability of labour to perform and produce output. Many development

theories explicitly connect investment in human capital formation to education and health, and the role of human capital in economic development, productivity growth, and innovation has frequently been cited as a justification for government subsidies for the education and health sector.

The fiscal policy role of government in human capital development is an issue of debate since the neoclassical economist period. Economists are of two different views about the role of government spending in human capital development to stimulate economic activities. The New Keynesians present the multiplier effect in response and argue that the increase in government spending on human capital will increase demand and infrastructure development and thus increase economic prospects through productivity and technology growth (Kakar, 2011). Other importance of government expenditure includes the provision of those facilities that are not fully covered by the market economy such as health and education. However, neo-classical economists argue that increased public spending on human capital will reduce the role of the private sector by crowding-out effect and thus slowing productivity (Otieno & Thomi, 2022). That is, human capital promotes positive benefits associated with economic growth, but the financial source for public expenditure which is taxation, reduces the benefits of the taxpayers and as such reduces the benefits associated with economic growth (Barro, 1990).

The performance of human capital is measured with the help of macroeconomic indicators such as the total number of years of schooling in the labour force, the number of educational facilities, the ratio of government expenditure on training to GDP and per capita expenditure on education and health (Wossmann, 2003). Following empirical studies by Barro and Lee (1993) and Wossmann (2003), this study adopted government expenditure measures to show how spending on human capital (health and education sector) raises the productivity of labour and stimulates development. Education and health services are the important factors that determine the quality of labour in developing countries (Hansson & Henrekson, 1994). This includes higher salaries and wages for workers, greater workforce effectiveness, and higher gross domestic product. Government expenditure on health could lead to economic growth in the sense that human capital is essential to production function by improving the quality of labour. A healthy population means higher productivity, thus higher income per head. But

due to the lack of sufficient revenue to fund ballooning expenditure, rise in financial crisis, and crowding out effect, there is a need to investigate the role of human capital spending on the economic prospects of East African economies. The specific objective of the study is to investigate the effect of human capital formation on the economic growth of East African countries.

This paper is organized as follows. In the next section, a selected review of the human capital formation literature and empirical gaps are presented. Then the formulation of an econometric model to be estimated is discussed. Theoretical underpinnings for the inclusion of explanatory variables are presented in this section. Econometric results are reported in the subsequent section. A final section gives concluding remarks as well as policy suggestions.

2. Selected Review of the Literature

Growth models of human capital development are best represented by the works of Musgrave and Rostow. Their views are generalizations gleaned from the examination of a large number of different historical trends of advanced nations (Brown & Jackson, 1996). In the early stages of economic development, public investment as a proportion of the aggregate investment of the economy is found to be high since public capital formation is of particular importance at this stage. The public sector is therefore seen to provide social infrastructure overheads such as roads, health, education, and other investments. This public investment, it is argued, is necessary to increase productivity and to gear up the economy for take-off into the middle stages of economic and social development. In the middle stage of growth, the government continues to supply investment goods but this time public investment is complementary to the growth in private investment (Gitonga et al., 2022). During all the stages of development, market failures and information asymmetry exist which can frustrate the push toward maturity, hence the increase in government involvement to deal with these market failures. Rostow claims that once the economy reaches the maturity stages the mix of spending will shift from expenditures on infrastructure to increasing expenditures on human capital (education and health) and welfare services (Brown & Jackson, 1996; Kibet et al., 2020).

The primary conclusion of Solow's (1956) theory is that the accumulation of physical capital cannot account for the vast geographic differences in output per person. The model predicted technological progress and human capital development typically assumed to grow at a constant 'steady state'- is what determines output growth. The augmented Solow growth model was introduced by Mankiw *et al.* (1992) and stresses the significance of including human capital in the Solow framework model. In addition, Ram (1986) and Barro (1990), added expenditure components (human, investment, consumption) to the Solow production equation that increases private capital marginal productivity and growth.

A significant number of empirical studies (Romer, 1996; Kweka & Morrissey, 1999; Akpan, 2005; Mitchell, 2005; Kibet et al., 2020) have been carried out on the relationship between spending (aggregate) and output growth. However, the majority of those studies (Akpan, 2005; Mitchell, 2005; Kibet et al., 2020) do not examine specifically the effect of human capital spending on output growth. In addition, some of the studies made use of time series data analysis which is prone to many econometrics disadvantages like multicollinearity and omitted variable bias (Gisore, 2022). As a result of the above-mentioned factors, the study found it necessary to fill the void.

3. Material and Methods

The study employed a quantitative research design to capture the trend and effect of human capital development on growth in East Africa. This was carried out in the period 1991- 2020 using secondary data and fixed panel data analysis. The choice of the study period was informed by the availability of secondary data. This was a sample of thirty (30) years. The reasoning behind this country sample was to reveal a pattern of human capital accumulation in East African economies.

3.1 Specification of Model

In this study, a neo-classical model developed by Ram (1986), Barro (1990), and Kweka and Morrissey (1999) was adopted for econometric analysis. In the model, output (y) representing economic growth was assumed to be a function of three factors, investment (k), human capital (h), and consumption (c). In the context of developing economies like East

Africa, Trade openness (o) and Population growth (P) are potential determinants of growth that are not accounted for by other independent variables and hence were included in the econometric growth model below.

$$y = f(h, k, c, p, t)$$

$$\ln y_{i,t} = \beta_0 + \beta_1 \ln h_{i,t} + \beta_2 \ln c_{i,t} + \beta_3 \ln k_{i,t} + \beta_4 \ln p_{i,t} + \beta_5 \ln t_{i,t} + \varepsilon_{i,t}$$

Where, $lny_{i,t}$ - Economic growth, measured by real GDP growth rate;

$\ln h_{i,t}$ - Human capital proxied by total health and education expenditure;

$\ln k_{i,t}$ - Public investment proxied by capital expenditure;

$\ln c_{i,t}$ - Public consumption proxied by recurrent expenditure;

$\ln p_{i,t}$ - Population growth measured by the population size;

$\ln t_{i,t}$ - Trade openness proxied by the ratio between the sum of exports and imports and gross domestic product (GDP); and

$\varepsilon_{i,t}$ -is the error term in time t and country i

3.2 Data Analysis

Descriptive and inferential analyses were used to analyse the panel data series, all to investigate the role of human capital development on growth using panel methodology.

3.2.1 Hausman Test

The Hausman (1978) test was applied to underpin the application of the fixed effects model in this analysis. This statistical test was generally used for deciding between applying a fixed or random effects model (Hausman, 1978; Baum, 2006). Fixed-effects (FE) are used whenever one is only interested in estimating the effect of variables that vary over time. An advantage of random effects is that one can include time-invariant variables (Baum, 2006).

3.2.2 Panel Unit Root Test

Macroeconomic time series data are generally characterised by stochastic trends which can be removed by differencing (LLC, 2002). This study adopted the Levin-Lin-Chu test to verify the presence of unit roots in the study data. The test was carried out to eliminate any possibility of spurious regressions and erroneous inferences. This involved determining the order of integration of the time series through the unit root test.

3.2.3 Co-integration Test

Following Engel and Granger's approach, the study attempted to determine whether a long-run relationship exists between the variables. The Engle-Granger approach is used to investigate whether cointegration relations exist between study factors (Granger, 1988). However, this approach can only be applied if there is only one cointegrating relation.

3.2.4 Post–Estimation Panel Diagnostic Tests

Post-estimation panel diagnostic tests were carried out during the study. Heteroskedasticity (modified Wald test), serial correlation (Wooldridge test), and cross-sectional dependence (Breusch-Pagan Lagrange Multiplier test) were tested for the regression models before estimation and corrected accordingly.

4. Empirical Findings

The next chapter presents the estimates of the regression coefficient for a sample of three East African countries.

4.1 Panel Unit Root Test

Accordingly, Levin-Lin-Chu's (LLC, 2002) unit root test was conducted at the level and first difference, and the result is reported in Table 1.

Table 1 Unit Root Test Results

Variables in Logs	Levin-Lin-Chu at Level		Order	LLC at First difference		Order
	Unadjusted t	Adjusted t		Unadjusted t	Adjusted t	
lny	-5.5309	-3.2789	I(0)	_	_	_
lnk	-4.8545	-2.6132	I(0)	_	_	_

lnc	-2.0781	-0.0564	I(1)	-7.6901	-5.0570	I(0)
lnh	-1.1185	0.7759	I(1)	-9.0697	-6.2458	I(0)
lnt	-2.7023	-0.1778	I(1)	-6.3576	-3.1815	I(0)
lnp	-3.6390	-1.0393	I(1)	-8.1229	-5.3380	I(0)

Table 1 findings reveal that all the variables are non-stationary at level except economic growth and public investment variables. However, they become stationary after the first difference implying that the variables are integrated into order one, I (1).

4.2 Panel Cointegration Analysis

Estimation of a cointegrating relationship requires that all-time series variables in the model be integrated in order of one (Granger, 1988). But from the results in Table 1, the dependent variable (economic growth) is already stationary I (0) while the rest of the variables are of order (1), hence they are not of the same integration. This, therefore, implies there was no co-integration since the variables are of different integration.

4.3 Fixed Effect Regression Analysis

The Panel data was estimated using the fixed effect model of the panel estimation technique, geared at controlling for time-invariant and unobservable country effects. The Hausman result supported the use of the fixed effect estimation method over the random method as supported by p-value (0.022 <0.050). The regression results on the effect of human capital accumulation on economic growth are presented in Table 2.

Table 2: Regression Results

Variable	Coefficient	Standard error	t-Statistics	p-value
cons	4.174	1.438	2.903	0.005***
lnh	0.746	0.079	9.410	0.011**
lnk	0.494	0.175	2.816	0.046**
lnc	-2.298	0.808	-2.844	0.006***
lnt	0.979	0.392	2.500	0.063*
lnp	-2.488	0.309	-8.050	0.015**
The goodness of Fit Test	R^2 = 0.56		Adjusted R^2 = 0.55	

F(7,85) = 5.852	P-value(F) = 0.0000	Durbin.W = 1.8629
Hausman Test	χ^2 (5) = 12.040	Prob> χ^2 = 0.0217
Wooldridge Test	F(1,2) = 10.035	Prob > F = 0.0869
Modified Wald Test	χ2 (3) = 1.390	Prob> χ2 = 0.7077

From the regression results, the coefficient of human capital is positive and statistically significant at 5 per cent as expected. The findings show that human capital outlay (health and education) is critical in enhancing economic prospects. It implies that a 1 per cent increase in human capital development will lead to about a 0.7 per cent increase in output in East Africa. The performance of human capital is measured with the help of macroeconomic indicators such as per capita expenditure on the education and health sector per empirical studies of Barro and Lee (1993), and Wossmann (2003). This is because a healthy and educated population is productive, which is necessary for increasing both industrial and agricultural output. When human capital increases in areas such as science, health, agriculture, industry, education, and management, it leads to increases in innovation, social well-being, equality, increased productivity, and improved rates of participation, all of which contribute to economic growth. This finding conforms to the findings by Barro and Lee (1993) and Wossmann (2003) but contrasts with Knight *et al.* (1996) and Loto's (2011) empirical studies.

From the results, the effect of public investment on economic growth is positive and significant at a five per cent level of significance. This type of expenditure could be associated with the productive infrastructure outlay that Barro (1990) and Gemmell (2001) pointed out to be an additional input to the production function. This public investment, as argued in growth models, is necessary to increase productivity and to gear up the economy for take-off into the middle stages of human and physical capital development. Public investment in energy and basic infrastructure is an essential precondition for capital accumulation in the private and public sectors (Barro, 1990; Mose, 2022). Gemmell (2001) and Niloy *et al.* (2003) agreed with the findings. In contrast, Josaphat and Oliver (2000) found the relationship between investment and growth in Tanzania to be negative as a result of the crowding-out effect.

The above results point out that public consumption has a negative and statistically significant effect on economic growth at a one per cent level of significance. It can be said that increased public consumption is usually at the expense of infrastructure and human capital development or the private sector's investment which in most cases leads to instances of reduced economic growth. Classical and Neoclassical theories consider consumption expenditure ineffective on the grounds of the well-known crowding-out phenomenon, that is, when public goods are substituted for private goods, this leads to lower private spending on education, health, or physical infrastructure. As the governments borrow heavily to fund spending, pressure in the credit market results in higher interest rates which discourage private investment. These results are in line with the findings of Barro (1990) and Lin (1994). On the contrary, Kweka and Morrissey (1999) reported positive findings in Tanzania which they associated with the rise in private consumption.

Trade openness is positive and statistically significant at ten per cent to economic growth. Trade openness not only brings foreign exchange and competition into the domestic market but also encourages innovation and redistribution of skilled workers to trade-related activities and reduces opportunities for rent-seeking. International trade encourages an exchange of ideas and technologies which implies that developing countries like Kenya, Uganda, and Tanzania can have access to superior technologies and develop human capital (Murphy *et al.*, 1991).

Study analysis depicts that population growth has a negative and significant relationship with economic growth. The Malthus'(1826) model stated that population growth can reduce the output per capita and human capital development because the population increases at a geometrical rate while production rises at an arithmetic rate so the output growth rate cannot keep the same pace. This finding is similar to Barro and Sala-i-Martin's (2004) study in developing countries.

The adjusted R^2 is 0.55 which implies that 55 per cent of the variations of the dependent variable are explained by the explanatory variables in the model. The F statistic test result reveals that the null hypothesis is rejected and a conclusion made that the estimators are non-zero and therefore are simultaneously significant at a 1 per cent level of significance.

Durbin-Watson's result is 1.86, implying serial correlation is not a problem. The study used the Wooldridge test for autocorrelation in panel data. The null is no serial correlation (0.0869). The study accepts the null hypothesis and concludes that the data does not have first-order autocorrelation. From the above result (0.7077) heteroscedasticity is not a problem.

5. Conclusion and Suggestion

The results reveal that spending on human capital formation and public investment should be a priority for a government interested in improving economic outcomes. Conversely, consumer spending may not translate into economic growth since it will affect mainly the demand side of the economy. The results further suggest that boosting budget allocation in human capital formation and infrastructure development can enhance its complementary role with private investment and stimulate economic growth. The government should increase its investment in areas that are beneficial to the private sector and move away from those that compete with it or crowd it out. In the same vein, reducing consumption expenditure to prop up capital and human investment is a policy recommendation worth pursuing. To increase human capital, governments need to build infrastructure in the education and health sector such as schools, hospitals, and universities. The second solution is to increase the knowledge and skill of tutors by issuing scholarships and sending them to study sciences in advanced institutions of learning. This policy would enhance the transfer of knowledge, skills, and technologies from advanced institutions that are mostly based in developed countries to developing nations. From the findings of this study, there is a need for further disaggregation of the human capital data into education and health services for deeper policy prescriptions.

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