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INVESTIGATING EDUCATION AND ECONOMIC GROWTH NEXUS IN THE ECONOMIC COMMUNITY OF WEST AFRICAN STATES (ECOWAS)

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Abstract

The study used annual times series data on gross domestic product, a conventional proxy for economic growth, educational expenditure, the human capital index, and research and development as a control variable from the World Bank development indicators and UNESCO institute of statistics for the period spanning of 1980 to 2021 for 15 ECOWAS member nations. In an attempt to reach the inference that expenditure on education had a substantial impact on the economic growth of ECOWAS member countries over the long and short terms using the panel ARDL. In contrast to the short run scenario, the influence was greater in the long term. In view of the findings it is recommended that the regional government should keep raising the budgetary allotment for education, develop the skills of young and capable minds, and guarantee that teachers receive frequent training and retraining. Finally, Entrepreneurship and innovation courses should also be offered, along with mentorship partnerships.

Key Words: *ECOWAS, GDP, education, cointegration, ARDL, panel*

1. Introduction

Advancement in the global economy is connected to the development in education especially science and technical education. Education has been regarded as the hallmark of human capital development of a nation, and human capital is considered to be a major catalyst for economic growth and development. The importance of education as a determinant of economic growth has been acknowledged over a long period of time. Economists like Adams Smith, Lucas and Solow have all prescribed education as

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an important factor and have over time developed many economic growth theories and models along that direction (Tamang, 2011). Furthermore, the society derived maximum benefits from education not only because of the quality and quantity of the labour workforce, but all human endeavor such as health and environment is positively related to the level of education, similarly, people are more aware and key participants in a democratic civil society (Chandra, 2010).

The role of education in any economy is more crucial today than ever before because of the knowledge based globalized economy, such attention is also rooted in the fact that productivity greatly depends on the quantity and quality of human resources, which itself largely depends on investment in education (Babalola, 2011). Three channels have been identified through which education affects economic growth and productivity. The first is that education increases the joint ability of the country's workforce to complete existing tasks quicker, thus saving productive time. The second channel is that tertiary and secondary education catalyze the assimilation of knowledge regarding new technologies, information, or product. Lastly, education improves the inventiveness of the labour force and enhances the country's local capacity to develop new technology and products (Grant, 2017). Education has also been posited to correlate with several outcomes indicating social development, such as health, fertility choices, and a sense of nationhood. These have been found to reduce the likelihood of social unrest and conflicts, leading to political and economic instability and deterring economic growth (Gyimah-Brempong, 2011; Rwigema, 2020).

More so, World Bank (1993) observed that the experiences of South-East Asian economies have proven that investment in education (human capital) is as important (if not even more than) as an investment in other identified factors of growth. Also, foreign investors tend to prefer investment in countries with better human resource quality; thus, it improves foreign direct investment flow, competitiveness, and growth (Deme & Mahmoud, 2020; Hassan & Ahmed, 2011; Wang, 2021).

In the African contest, where there is a large population and labour force, the economic growth rate of Sub-Saharan Africa (SSA) has been highly unstable over the last few years, with 6 percent growth in 2010, then dropped to 2.8 percent in 2015, and further to 1.4 percent in 2016, and -2.1 percent in 2020, with a rebound of 4.2 percent in 2021 and then slowed to 3.6 percent in 2022 (World Bank, 2022). This is in the light of the high rate of human capital decadence. The World Economic Forum (WEF, 2017) reports that the SSA has a human capital gap of up to 47 percent, making it one of the worst in the world. Again, specifically, in terms of education, SSA has one of the worst outcomes, with over 64 million children out of school and over 60 percent of youths out of school in 2020 (World Bank, 2023).

Despite the high availability of labour due to a large labour force in the SSA, the available skilled labour suffers challenges of labour demand shortage as the regional economy cannot absorb the teeming labour force. This leads to the brain drain problem, where skilled labour and human capital exit the country in droves to contribute to foreign economies where there is labour demand. This renders the little efforts made by governments of the SSA countries towards improving education ineffective since the trained human capital cannot contribute to the region's economic development. Furthermore, ill-implemented development strategies could have further led to underutilizing the pool of educated workforce. For instance, Gyimah-Brempong (2011) observed that the import-substitution industrialization strategies adopted by most SSA countries aimed at a lesser foreign competition to the domestic firms could have dis-incentivized the local firms' drive to innovate and consequently resulting in the underutilization of skilled and educated workforce. This would mean that however educated the populace is, it will not translate to substantial economic growth. Accordingly, Kolosnitsyna and Ermolina (2021) pointed out that in an economy at the lower levels of development and low education level of the general populace, diverting public funds toward higher professional education could slow economic growth in the short run.

Although a large proportion of studies on the impact of education on economic growth toes towards theoretical positions, a consensus on whether education improves economic growth has not been reached. While some studies have found education insignificant in determining economic growth, others are of the view that education is important for growth. The disparity in conclusions largely results from using different proxies for education and different regions/countries studied. This study is different from other existing studies in that it considers the impact of research and development (R&D) in its analysis. This is to understand how education affects growth when there is adequate room for the human capital resource of an economy to be innovated. Also, this study focuses on the Economic Community of West African States (ECOWAS). This is because despite the high level of integration between countries of the union, which makes human capital mobility easy among member countries, there has been little attempt at studying the union as a whole in the literature. Hence, this study examines the impact of education on economic growth in ECOWAS member states using panel ARDL approach.

2. Literature Review

2.1. Conceptual Reviews

Education was broadly described by Ali et al., (2018) as the process of imparting knowledge, abilities, and habits to others through instruction, research, and presentation**.** While Marvelous, Aigbedion and Emily (2017) see education as a set of activities that entails handling down the ideas, values, and norms of the society across generations. To Jelilov et al., (2016) education is the process by which an individual develops the numerous physical and social skills necessary to function in the society in which they are born. Economic growth is the increase in production of goods and services in a country. Jhingan (2011) viewed the concept of economic growth as related to a quantitative sustained increase in the countries per capita output or income accompanied by an expansion in its labour force, consumption, capital, and volume of trade. However, according to Usman and Adeyinka (2019) it entails long run process involving a period of time, increase in real per capital income level and volume of production linked with large increase in the productive ability of the economy, urbanization, equitable distribution of income and wealth among the population which result in reduction of poverty and unemployment in a country.

2.2. Theoretical linkage

Economic theories have identified several factors that determine economic growth. For instance, while the early Classical economists consider physical capital accumulation, the Keynesians consider aggregate demand as the key driver of economic growth (Mosikari, Xaba & Tsoku, 2016). On the other hand, the

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neoclassical emphasizes the importance of human capital development in education (Fix, 2018). According to neoclassical economists, economic growth is a product of labour productivity which can be made more productive and efficient by technological advancement, education, and training (Gueye, 2022; Fix, 2018).

The endogenous growth model has been chosen as the framework for this study. It is a neoclassical postulate which promotes the fact that economic growth occurs as a result of changes emanating from within the system rather than external sources. The endogenous growth model has undergone several modifications by economic theoreticians such as Cobb and Douglas (1928), Solow (1956), and Romer (1986, among others. Solow (1956) like most other neoclassical growth theories, derived his approach to economic growth from the popular Cobb and Douglas (1928) model. In his opinion, Solow (1956) postulated that economic growth is dependent on the interconnection between physical capital and labour. In its basic form, the Solow model of growth is presented as follows:

$$Y = AK^{\alpha}L^{\beta} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where: Y is economic output, K represents stock of physical capital, L is stock of labour, A is technological efficiency parameter, while α and β are parameters of the production inputs (Gustafsson, 2014). According to Solow (1956), A from equation (1) could include features of labour such as education and skills as well as features of capital such as efficiency and quality of equipment.

Having been criticized about not adequately stressing the role of human capital, attempts made by economists led to the development of the augmented Solow model. Accordingly, Mankiw, Romer and Weil (1992) (also known as MRW) presented a more updated and encompassing version of the original Solow model presented as follows:

$$Y = AK^{\alpha}H^{\beta}L^{1-\alpha-\beta} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where; H represents human capital and the other variables remin the same as in the Solow model. This extension of the theory recorgnises explicitly, the importance of education and skills in the process of production and how research and development as well as constant training contribute to its improvement. Hence, implying that human capital is as distinctly important as labour in the production process. This study therefore, adopts a version of the MRW in to analyze the impact of education on economic growth.

2.3. Empirical Review

Large body of knowledge on the education-growth nexus trends in the past decades, findings emanating thereof produced mixed results depending on the country, region, integration, global economy, time frame, choice of econometric model and whether the study is cross sectional or longitudinal. Nidhi (2014) for instance study the impact of education on economic growth in India using annual time series. Findings from the study suggests that primary education have a long-term impact on the GDP of India. Jameel & Naeem, (2016) study the nexus between human capital and economic growth using fixed and random effect model on the eleven countries for the period of 1992 to 2014. The results show that there is a long-term relationship between the real gross domestic product and human capital. While the fixed effect model revealed that human capital has a significant positive effect on the economic growth. Similarly, Hanif and Arshed, (2016) investigate the impact and contribution of primary, secondary and tertiary education and the importance of education in economic growth of Sub-Saharan African Region spanning the period between 1960 to 2013 using OLS and fixed effect model. Findings revealed that education has robust positive effect on economic growth and recommends heavy investment in education sector. Using ordinary least square method, Mat et al., (2015) study the effects of human capital investment on education, health and migration to economic development in Malaysia for the period of 1980 to 2010. The findings therein depict that higher GDP per capita is influence by better literacy rate, longevity of life expectancy at birth and required number of immigrants with a sustainable grow domestic savings and reduced unemployment rate. Mekdad et al., (2014) investigate the nexus between public education expenditure and growth in Algeria using the popular Johansen cointegration method and granger causality test technique for the period of 1974-2012. They found that public spending on education has positive and significant effect on economic growth. Other explanatory variables also exert effect on economic growth but not as big as the education effect. Again, Zivengwa et al., (2013) examine the causality between education and economic growth in Zimbabwe for the period spanning 1980 to 2008. They found evidence of unidirectional granger causality between education and economic growth, similarly, the results of variance decomposition and impulse response functions lend backing to earlier findings. The results further confirm a transmission mechanism that runs from education to economic growth through physical capital investment. Using the panel of 13 south African development community, Khembo and Tchereni (2013) analyzed the relationship between human capital formation and economic development. The results show that education is positively correlated with economic growth. They recommend that any economy should give serious attention to health and education facilities for attaining growth. Obialor, (2017) investigate the impact of the human capital investment on the economic growth of Nigeria, South Africa and Ghana from 1980 to 2013, the results therein indicate that two of the three human capital variables namely; health expenditure and government expenditure on education show significant positive impact on growth in Nigeria, while literacy ratio is insignificantly positive in all countries. Using VAR and granger causality test, Sghari and Hammami (2013) examine the relationship between health expenditure and GDP in developed countries from 1975 to 2011. They found evidence of long run relationship between the rise in health care and economic growth. Similarly, the relationship between health expenditure and economic growth was found to be positive. In another similar study by Adeyemi & Ogunsola, (2016)using ARDL approach to cointegration on Nigerian data spanning the period from 1980 to 2013 found positive and long run relationship among secondary school enrolment, public expenditure on education, life expectancy rate, gross capital formation and economic growth though statistically insignificant. The outcome further revealed that negative long run relationship exists among primary, tertiary school enrolment, public expenditure on health and economic growth. Boachie (2015), study the economic growth effect on the health of workers in Ghana using bound test approach to cointegration. The findings from the study revealed that growth is significantly driven by health both in the short run and long run. The growth effect of health in the short run was found to be ignorable. Lawanson, (2015) utilized the dynamic difference GMM panel technique to empirically assess the importance of the education and health components of the human capital on the economic growth of the 16 west African economies

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over the period spanning 1980 to 2013. He found evidence of positive and significant impact of health and education on GDP per capita, therefore, affirms the strong relevance and importance of the two components in west African countries under investigation.

3. Methodology

3.1. Model specification and Techniques of data analysis

This section presents the estimation techniques adopted by the study. First, the descriptive characteristic of the data is observed using the measure of central tendency and measure of dispersion, followed by the correlation coefficients of the data. In the next step, the stationary statistics of the variables are observed using the Fisher's ADF and PP test and Hadri test of stationary under panel settings. Finally, the panel cointegration approach.

Recent development in the field of applied econometrics suggest that panel-based unit root test tends to be more powerful and robust than time series individual unit root. Many statisticians suggest different method of computing unit root test in panel data. See (lm, Pesaran and Shin 2003; Levin, Lin and Chu 2002; Choi 2001; Breitung 2000; Hadri 2000 and fisher-type test using ADF and PP tests, Maddala and wu 1999). For the purpose of this study, we use Fisher-type test that adopt ADF and PP test and Hadri test is used. The essence of considering unit root in panel analysis as observed by Baltagi (2005) and Entorf (1997) was that whenever time frame of data approaches infinity with finite variables, nonsense regression set in and inference based on t-values computed can be highly misleading.

3.2. Model Specification

As earlier established in the literature section, the theory underpinning this research is the popular endogenous growth model, where mostly the growth is a function of the labour and capital as well as augmenting factors such as technology. We mostly referred to the popular Cobb-Douglas production function to depict the functional and mathematical relations.

$$Y = AL^{\alpha}K^{\beta} \ldots . eq.1$$

$$Y = f(l, c, A) \ldots . eq.2$$

$$Y/_l = f\left(l/_l, c/_l, A/_l\right) \ldots . eq.3$$

$$Y/_c = f\left(l/_c, c/_c, A/_c\right) \ldots . eq.4$$

3.3. Panel Cointegration (P-ARDL)

To establish the long run equilibrium on the panel of the ECOWAS region, this study applied the panel autoregressive distributed lag model. This is applied on the three major theorems namely; mean group, pooled mean group, dynamic fixed effect. Following the specification of pesaran et al. (1999), the model of the p and q order (ARDL[p,q]) is specified below;

$$GDP_{it} = \sum_{j=i}^{p} \gamma_{ij} GDP_{i,t-j} + \sum_{j=i}^{q} \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} . . eq.5$$

Where; $i = 1,2,3 \ldots ..N$ number of cross sectional (here i=N=15); t = 1,2,3……..T total time period (T = 40). X is the vector of explanatory variables, δ'_{ij} are the kx1 coefficient vectors. γ_{ij} are the scalars, μ_i is the cross-sectional effect. It happens that if the variables in equation 5 are integrated of order one and cointegrated, then the disturbance term should follow I(0) stochastic process. The short run dynamic equation can be specified by reparametrizing of equation 5 as written below;

$$\Delta GDP_{it} = \emptyset_i\left(GDP_{i,t-1} - \beta'_i X_{it}\right) + \sum_{j=1}^{p-1} \alpha^*_{ij} \Delta GDP_{i,t-j} + \sum_{j=1}^{p-1} \alpha^{*\prime}_{ij} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} . . eq.6$$

β'_i is assumed to be the coefficient of interest because it captures the long run effect of the independent variables on the dependent variable while $\emptyset_i$is the error correction term.

3.4. Fisher-type Test Using ADF and PP Tests

One special feature of fisher-type test as observed by Whitehead (2002) is that it considers a unit root test on each panel's series separately, then combine the p-values to obtain an overall test of whether the panel series contains unit root by utilizing the Choi (2001) methods. It has advantage over Lm, Pesaran and Shin in that it does not require a balanced panel, it can also use different lag length in the individual ADF regressions. Consider a separate ADF regression specify for each cross section below,

$$y_{it} = \alpha y_{t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{t-j} + X^{\circ}_{it}\, \delta + \varepsilon_{it} \ldots\ldots\ldots\ldots 1$$

The null hypothesis for the above test can be written as; H_0: $\alpha_i = 0$ for all i while the alternative hypothesis is given by

$$\begin{cases} \alpha_i = 0 \;\; for\; all\; i = 1,2,3, \ldots \ldots . N \\ \alpha_i < 0 \; for\; i = N+1, \;\; N+2 \ldots . N \end{cases}$$

If we define φ_i as the p-value from any individual unit root test for cross-section, then under the null of unit root for all N cross-sections, we have the asymptotic result that

$$-2 \sum_{i=1}^{N} \log(\varphi_i) \rightarrow \chi^2_{2N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

In addition, Choi demonstrate that

$$\frac{1}{\sqrt{N}} \sum_{i=1}^{N} \emptyset^{-1} \varphi_i \rightarrow N(0,1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ldots\ldots 3$$

Where $\emptyset^{-1}$ is the inverse of the standard normal cumulative distribution function.

3.5. Hadri Unit Root Test

The second test considered by this study is Hadri test of panel stationarity, Hadri test is similar to KPSS unit root test and has a null hypothesis of no unit root in any of the series in the panel. The test considers the residual from individual regression of series under investigation. Consider the equation below:

$$y_{it} = \delta_i + \eta_i t + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Given the residual ε from the individual regressions, LM can be formed which can later be integrated in Z statistics

$$LM = \frac{1}{N}\left(\sum_{i=1}^{N} \left(\frac{\sum s_i t^2}{T^2}\right)\right) / f_0 \ldots\ldots\ldots\ldots\ldots\ldots 5$$

Where $s_i t^2$the cumulative sums of the residuals, from the above Hadri formulated the following Z-statistics

$$Z = \frac{\sqrt{N}(LM - \xi)}{\zeta} \rightarrow N(0,1) \ldots\ldots\ldots\ldots\ldots\ldots 6$$

Where $\xi = 1/6$ and $\zeta = 1/45$

Moreover, this study source data from the world bank development indicators and UNESCO institute of statistics. The data covers the 15 ECOWAS member nations. Annual times series data on gross domestic product as a proxy for economic growth, educational expenditure, human capital index and research and development as a control variable for the period covering 1980 to 2021 were collected.

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4. Empirical Results and Discussions of findings

Table 1. Panel descriptive statistics

Variables	Mean	Std. dev.	skewness	Kurtosis	Normality test
GDP	2.35	6.84	4.84	27.73	18069.61
Eduexp	22.10	14.88	2.38	8.83	1448.07
R&D	-0.14	0.06	-0.64	4.87	333.09
HCI	0.35	1.00	-1.54	4.17	77.15

Source: Author's computation using eviews10, 2023

Table 1 provides the panel the summary statistics that consist of the mean, median, standard deviations, skewness, kurtosis and the normality test. The mean give the average value of a data set; standard deviation measures to clustering of the data around the mean, or the regression line where the closer the data to the mean, the better the distributions, skewness is the measure of the asymmetry of the distribution and a distribution is said to be a symmetrical when it is skewed to the right (position) or to the left (negative) but the normal distribution is when this skewness is zero. Also kurtosis measures the peak or flatness of the distribution also, measures how often the distribution have outliers.

The distribution maybe a platykurtic (thin tailed) low kurtosis, lyptokurrtic (flat tailed) high kurtosis, or mesokurtic (medium tailed) normal distributed which is 3. From the Table 1, the mean, standard deviation, Skewness, Kurtosis and Normality test are 2.35, 6.84, 4.84, and 27.73 respectively for GDP which means the data have deviates from the mean and is skewed to the right and has a flattened tail making it not to be normally distributed. While 22.10, 14.88, 2.38, and 8.83 respectively for education expenditure (Eduexp); which mean the data clustered around the mean, but is positively skewed and is flattened tailed. Further, -0.14, 0.06, -0.64, and 4.87 respectively for R&D; and 0.35, 1.00, -1.54, and 4.17 respectively for human capital index (HCI) and it means that the data odes not cluster around the mean, and it is skewed to the left and is thinned tailed.

Table 2. Panel Unit Root Results

Variables	Fisher-ADF		Hadri	
	Level	1st diff.	Level	1st diff.
GDP	76.33*		11.945	7.013*
Eduexp	37.55	130.944*	8.732	2.929*
R&D	402.181*		8.789	8.840*
HCI	166.104*		11.345	9.861*

*, ** & *** signifies stationarity at 1%, 5%, 10%.

Source: Author's computation using eviews10, 2023

Table 2 provides panel unit root results using two approaches: the fisher-ADF and Hadri. The Fisher – ADF results show that GDP, R&D and HCI respectively at level are stationary at level, while education expenditure is not stationary at levels but becomes stationary at first difference. More so, the Hadri results show that GDP, education expenditure, R&D and human capital index are not stationary at levels but are stationary at 1st difference. Using the Fisher – ADF results, GDP, R&D and human capital index are integrated at order zero, while human capital index is integrated at order one. On the contrary, the Hadri results suggest that GDP, education expenditure, R&D and human capital index are all integrated at order one. These results confirmed the prerequisite condition for the adoption of ARDL model (Pesaran & Shin, 1999).

Table 3 Panel ARDL Long-run estimate result (GDP as the dependent variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EDUEXP	-13.2161	3809.098	-0.00347	0.9972
HCI	3.2800	4.9100	6.685806	0.0000
R_D	9.3700	8.3600	11.20695	0.0000

Source: Author's computation using eviews10, 2023

The panel ARDL long-run result presented in table 3 revealed that education expenditure has an inverse relationship with growth because, the coefficient of -13.2161 means a unit increase in education expenditure will lead to a decline in growth, though the relationship is insignificant. However, human capital index and research and development shows a positive and significant influence on growth because, a unit increase in each of them will increase growth by 3.2800 and 9.3700 units, respectively, all things being equal.

Table 4 Panel ARDL Short-run estimate result (*GDP* as the dependent variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
COINTEQ01	-0.337083	0.066985	-5.032202	0.0000
D(GDP(-1))	0.110608	0.072806	1.519224	0.1296
D(GDP(-2))	0.023148	0.051326	0.451006	0.6522
D(GDP(-3))	-0.007458	0.046743	-0.159551	0.8733
D(EDUEXP)	-3.41E+12	3.41E+12	-1.000005	0.3180
D(EDUEXP(-1))	2.34E+13	2.34E+13	0.999998	0.3180
D(EDUEXP(-2))	-2.88E+13	2.88E+13	-0.999997	0.3180
D(EDUEXP(-3))	8.91E+12	8.91E+12	0.999984	0.3180
D(HCI)	1.81E+13	1.98E+13	0.912859	0.3619
D(HCI(-1))	1.92E+13	2.66E+13	0.72275	0.4703
D(HCI(-2))	-2.42E+13	3.02E+13	-0.801955	0.4231
D(HCI(-3))	-1.95E+13	2.74E+13	-0.71355	0.4760
D(R_D)	-8.41E+13	9.02E+13	-0.932931	0.3515
D(R_D(-1))	6.90E+13	2.22E+14	0.310576	0.7563
D(R_D(-2))	-1.18E+14	2.65E+14	-0.444795	0.6567
D(R_D(-3))	1.27E+14	2.22E+14	0.572119	0.5676
C	9.55E+11	1.06E+12	0.90161	0.3678

Source: Author's computation using eviews10, 2023

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Moreover, the short-run result presented in table 4 contains the cointegration equation and the lag values of dependent and independent variables. The cointegration equation is negative and statistically significant which means, there is long-run relationship among the variables. Also, the coefficient of the cointegrating equation is -0.3371 which means that for every disequilibrium in the long-run the model is going to return to equilibrium within a short period of time by 33. 71 percent. Likewise, the long-run, education expenditure also has an inverse relationship with growth with -3.1400 unit decrease on GDP, but still is statistically insignificant. This means that expenditure on education has no influence on growth in both the short-run and long-run. Also, research and development have inverse effect on growth as a unit increase will lead to a decrease in growth by -8.4100 units though it is statistically insignificant. However, human capital index has a positive effect on growth as it increases growth by 1.8100 units but statistically insignificant.

5. Recommendations and Policy Implications

Based on the findings the study recommends that the regional administration should continue to increase the budgets allocation on Education in line with the UNESCO target. this will help to build and enhance the educational infrastructure hear by Rising the quality of regional human capital ECOWAS member states should ensure the training and retraining of teachers on a regular basis in others Improve the quality of its teachers by doing this it would help raise the standard of education. Education should be made compulsory and accessible to a certain level for all members of the region, also entrepreneurship and innovative courses should be introduced in addition to mentorship relationships in order to help build up skills of young and able minds. This will help to reduce the over dependence on government jobs. Research and development grants and funds should be made accessible in order to help researchers come up with new and improved ideas. These would help to utilize the excess natural and human resources available in the West African region.

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