HUMAN CAPITAL AND ECONOMIC GROWTH; AN EMPIRICAL ANALYSIS OF THE IMPACT OF HUMAN CAPITAL DEVELOPMENT ON ECONOMIC GROWTH IN GHANA

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ABSTRACT

The perceptible contribution of human capital in economic growth in an economy cannot be exaggerated. Human capital is the essential resource needed in every sector of an economy. Unfortunately, for many decades human capital development has been saddled with multifarious challenges that has hampered economic growth in many economies; with less developed economies suffering the effect of poorly developed human capital the most. This study was conducted to investigate the impact of human capital on economic growth in West Africa, specifically Ghana over a period of 40 years. The researcher used secondary data on human capital development and economic growth that was extracted from the economic data of Ghana Statistical Service, the World Bank, journals of economic studies and the Bank of Ghana Research Unit. The researcher applied ordinary least squares regression to estimate the models and also perform data analysis. In the end, it was found out that human capital whether it is developed or under developed has a tremendous impact on the growth of an economy both in the short and long term. The findings of this study hold important policy implications for countries in West Africa, specifically Ghana.

Key Words: Economic Growth, Education, Ghana, GDP, Health, Human Capital Development

INTRODUCTION

Background of the Study

Popular opinion dating as far back as the human capital revolution in the 1960's and the advocacy of the human capital theory by Schultz (1961) and Becker (1964) has it that human capital is a necessary and sufficient condition for economic growth, hence replacing the previously held opinion that physical capital is the ultimatum for economic growth. Per capita output growth is however an important component of economic welfare (Abramowitz, 1981) which indicates that for economic growth to occur, there ought to be inputs and inputs can only be made by acknowledging and harnessing the prowess of human beings as history has repeated itself time again in proving that human beings are the most important and promising source of growth in productivity and economic growth.

The impact of human capital development and economic growth has been emphasized in growth theories (Romer, 1986; Lucas, 1988).An implication of Lucas' hypothesis on human capital is thus associated with investment in man and his development as creative and productive resource (Harbison, 1962). When man is invested in, he becomes human capital and develops into a productive input to economic growth and development. This is the reason why all countries are channelling their efforts into human capital harnessing and development – the More Developed Countries (MDCs) and Less Developed Countries (LDCs) alike.

The MDCs are obviously highly productive while the LDCs are less productive in terms of human capital development. Reasons for these are not far-fetched as the closest and most dominant is the usage of human capital; the former has highly developed human capital while the latter has a low development in terms of human capital. Human capital theory provides a justification for large public expenditure on education both in MDCs and LDCs and this theory is consistent with the ideologies of democracy and liberal progression found in most MDCs. Its appeal is based upon the presumed economic returns of investment in education both at the macro- and micro-levels.

Efforts to promote investment in human capital have been seen to result in rapid economic growth for these societies. For individuals, such investment was seen to provide returns in form of individual economic success and achievements (Fagerlind and Saha, 1997).

A telescopic view of Ghana revealed that she is blessed naturally with mineral resources such as cocoa, crude oil, gold, etc. and numerically with a teeming population of approximately 24,000,000 people as at 2010, half of which can be harnessed and developed into capable human capital and as such capable of making her a monument of economic growth if these resources are harnessed properly. Despite the fact that the Ghanaian government has been adopting and mapping out certain policies targeted at human capital development. Ghana has failed to achieve sustainable human capital development which is the highest priority on the priority list of most countries under the umbrella of United Nations development programme.

The term human capital means education, health and other human capacities that can raise productivity when increased (Todaro, 1990). Todaro revealed that human capital covers the sectors of education and health, hence when human capital is talked about; the focus is always on the education and health sectors. Lucas (1988) further measured human capital as the expenditure on education and "external" human capital, which he believes can be measured by calculating the returns to land. Babalola (2003) supported Lucas's view based on three arguments that supports the rationality behind the investment in human capital:

1. That the new generation must be given the appropriate parts of the knowledge which has already been accumulated by previous generations.
2. That the new generation should be taught how existing knowledge should be used to develop new products, to introduce new processes and production methods and social services.
3. That people must be encouraged to develop entirely new ideas, products, processes and methods through creative approaches.

One of the reasons why human capital has been on the low side in Ghana could be attributed to the disinvestment in human capital. In the broad sense, investment in human capital means expenditure on education, health and social service in general; and in the narrow sense, it implies expenditure on education and training. Although education is fundamental to enhancing the quality of life and ensuring social and economic progress (UNR, 1996), the development of human capital transcends mere acquisition of intellectual ability through the education system, or the living of healthier life via adequate healthcare; it seeks to improve the productivity of the individual and make him more useful to society (Jhingan, 2005).

To further explain the essence of human capital in the society, (Bloom and Malaney, 1998) and (Bhargava et al., 2001) demonstrated that health is an important factor of economic growth since it extends the life expectancy of the labour force using life expectancy at birth as a measure of health status. According to Lyakurwa (2007), human capital development has the capacity to enlarge people's choices and opportunities, improve healthy living through acquired skills and knowledge and eventually enhance growth in the nation's gross domestic product through increased productivity. The main problem associated with the belief that education is good for economic growth is linked with how to maintain an equilibrium position, that is, where there will be no incidence of either shortage or excess supply of educated people.

A shortage of educated people might limit growth while excess supply of it might create unemployment and thus limit economic growth (Lee, 1989). In essence, it means that the impact human capital will supposedly have on economic growth will be achieved when there is an equilibrium point in human capital development (in the aspect of education) in order not to create a situation whereby many people are chasing few jobs. This also applies to the health aspect of human capital – if there's an incidence of shortage of healthy people, it would have a negative impact on economic growth because it is only a healthy person that can be productive; if there's an excess supply of healthy people in the society, it would probably lead to overpopulation which will also limit economic growth. A typical scenario of

shortage of educated people and healthy people is evident in Ghana and the resultant effect has been low level of growth and development.

It is not really only about human capital improving health and education but also making sure that in the long run, it will positively influence the path to economic growth in the country as well as maintaining a sustainable growth rate. This feedback is crucial to ensure availability of funds for further human development because it is a bilateral relationship (human capital leads to economic growth and economic growth in turn leads to further development of human capital).

n view of this, we shall examine the human capital development ratio and its impact on economic growth in Ghana, however the puzzling questions remain:
what is the level of human capital investment in Ghana? If the investment is positive and in line with theoretical and practical affirmations as it ought to be, what then is its implication on the economic growth of Ghana?

Problem Statement

Lack of human capital development has been and is still a burning issue (economically and socially) in Ghana. Capital and recurrent expenditure on the two facets of human capital (education and health) by the Ghanaian government has not been sufficient enough to propel the impact human capital ought to have on the economic growth of the country in the long run due to the government's inability to allocate the necessary funds needed. This is a challenge confronting knowledge and skill development in Ghana. In cases where there is funding, it is not efficiently allocated and properly implemented. The World Bank (2010) is of the view that government funding for university research is too low to attract partners in the economic and business work environment into R & D agreements. This is unlike the case in Singapore, Korea and other advanced knowledge economies. Losing out on this partnership is constraining Ghana's potential in breaking into a lucrative and job-creating economy (World Bank, 2010).

One of the major concerns in the Ghanaian educational system is the challenge of integrating new knowledge into

academic courses and programmes. The system operates on obsolete knowledge, thus finding it difficult to embrace new knowledge and discoveries. This leads to production of graduates' who find it difficult to fit into the world of work, since their acquired knowledge and skills are rarely relevant to the needs of employers of labour services. This problem is the result of lack of connection between the academia and the business work environment (World Bank, 2010), which has impeded the nation's capacity to build the critical mass of human capital required to facilitate growth.

Several other mitigating factors relating to human capital development emanate from the health sector. For instance, the Ministry of Health (2010) reported that non-communicable diseases account for an estimated 86,200 persons in Ghana each year with about 55% of the victims aged less than 70 years. These startling figures and the fact most adults between the ages of 15-59 years are affected should be a great source of worry to all. This is because these people are the productive force whose shoulders the socio-economic development and advancement of the country rests.

Objectives of the Study

Broadly, the objective of this study is to find out the implication of low human capital development in Ghana and how it affects economic growth in Ghana in the short and long run. With this in mind, the objectives of this study are:

(i) Determining the level of human capital investment in Ghana.

(ii) Determining the impact of human capital on economic growth in Ghana.

Research Questions

(i) What is the level of human capital investment in Ghana?

(ii) What is the impact of human capital on economic growth in Ghana?

Significance of the Study

This study was conducted in order to ascertain the level to which economic growth has been propagated by human capital formation, investment and retention in the Ghana economy. It will help the government make better decisions/policies toward investment in the human capital area and will also influence what Ghanaians think human capital is all about.

The Scope of the Study

This study concentrates on human capital development and its impact on economic growth in West Africa, specifically Ghana. The time frame of this study is 1970-2010.

Limitation of the Study

The study should have included other countries like Nigeria, Benin, Togo and Burkina Faso but financial challenges made it impossible for the researcher to achieve this desired objective.

Organisation of the Study

The study proceeds as follows. The next chapter presents a review of the extant literature on the topic under consideration. The literature review centres on both theoretical and empirical literature on the impact of human capital on economic development. Chapter three covers the data and methodology used in this study. The chapter explains the rationale for the selection of particular variables as well as the researchers` expectations of the possible relationships between variables selected and the impact of human capital on economic development. The chapter further explains the model used in the data analysis. Chapter four presents the empirical findings of the study as well as discusses these results based on theory and empirical evidence and the overall objectives of the study. Chapter five provides a summary of the major results of the study, a conclusion of the study based on the results, and suggests recommendations based on the conclusions reached in this study.

LITERATURE REVIEW

This chapter of the study presents a critical review of the extant literature on the impact of human capital on economic development. The literature review in relation to the impact of human capital on the economic growth of Ghana will focus on three (3) aspects which are: theoretical literature, empirical literature and summary of literature. The review cuts across the world and Ghana in particular. Generally, the literature reveals the impact of human capital on economic development. The review would help to identify what factors should be considered and what methodology to employ.

Theoretical Literature

Several factors influence human capital and the impact it has on economic development. It is important to recognize and understand the underlying concepts and definitions relating to human capital and the impact it have on economic development. This section will consider human capital as a factor of production. Finally, this chapter explains some theoretical frameworks that are helpful in assessing the relationship between human capital and economic development.

Solow-Swan Growth Model

This model, developed by Robert Solow and Trevor Swan in the 1950s, was the first attempt to model long-run growth analytically. This growth model is also known as The Solow Model, named after Robert Solow because of his popularity. At the center of this model is the neoclassical aggregate production function. The notion of growth as increased stocks of capital goods (means of production) was codified as the Solow-Swan Growth Model, which involved a series of equations showing the relationship between labor-time, capital goods, output and investment. According to this view, the role of technological change is crucial, even more crucial than the accumulation of capital. This model assumes that countries use their resources efficiently and that there are diminishing returns to capital and labor increases. From these two premises, the neoclassical model makes two important predictions:

i. Increasing capital relative to labor creates economic growth, since people can be more productive given more capital.
ii. Because of diminishing returns to capital, economies will eventually reach a point at which any increase in capital will no longer create economic growth. This point is called a "*steady rate*".

The model also notes that countries can overcome this *steady state* and continue growing by inventing new technology. In the long run, output per capital depends on the rate of saving, but the rate of output growth should be equal for any saving rate. In this model, the process by which countries continue growing despite the diminishing returns is "exogenous" and represents the creation of new technology that allows production with fewer resources. Technology improves, the steady state level of capital increases, and the country invests and grows.

In its general form, the Solow-Swan growth model states that:

$Y=F(L,K;T)$ . . . . . (i)

Where,

Y = Output; L = Labour; K = Capital; T = Technology

The above equation indicates that output (Y) is produced from the combination of inputs labour (L) and capital (K) under certain technology (T).

The production function is more represented as:

$Y(t) = F(K(t),A(t)L(t))$ . . . . . (ii)

Formally, the main aspects of the Solow–Swan model can be derived from the differential equation that describes capital accumulation as:

$\dot{k}(t) = s f(k(t)) - (n+\delta+g) k(t)$ . . . . . (iii)

Where,

k is capital; t is time; n is population growth; δ is the amount of capital needed to cover depreciation; g is technological progress.

Capital (per effective labor) accumulates if the proportion of output saved (and thus invested) is higher than the break-even investment, defined as the amount of capital needed to cover depreciation δ, population growth n, and technological progress g.

In the steady state, capital per effective labor k* is constant by definition and hence k (t) = 0. The standard Cobb–Douglas production function is used in this demonstration, so its intensive form is defined as f (k (t)) = k (t)$^{\alpha}$, 0 < α < 1, where α is the elasticity of capital. It is evident from the model dynamics that only a change in the rate of technological progress g has any influence on the long-run growth rate of per-capita output and consumption. For any other parameter change, the growth rate eventually converges back to the original value of g. The following are the assumptions of the Solow-Swan growth model:

i. Technology is free, as a non-excludable, non-rival good.
ii. All goods and factor markets are competitive.
iii. Depreciation in the value of capital due to wear and tear.

The following are the implications of the Solow-Swan Growth Model.

i. Data does not support some of this model's predictions; in particular that all countries grow at the same rate in the long run or that poorer countries should grow faster until they reach their steady state. Also, data suggests the world has slowly increased its rate of growth. However, modern economic research shows that the baseline version of the neoclassical model of economic growth is not supported by the evidence.
ii. This model suggests that savings will not sustain growth. The savings will be used for production of goods (via machinery) and the forfeiting of current consumption, but in the long-run, it won't still increase growth.
iii. Diminishing marginal product of capital.
iv. Constant returns to scale.

Augmented Solow Growth Model

This is the Solow (1957) or Neoclassical model - an improvement on the Solow growth model. Solow's original model did not explicitly incorporate human capital. In order to do that, Mankiw, Romer, and Weil (1992) came up with the augmented Solow model. The justification for the inclusion of human capital

in this model is the fact of non-homogeneity of labour in the production process either within a nation or across different economies due to their possession of different levels of education and skills. This modification facilitates the suitability and hence, the adaptation of this model for the Ghanaian context. The basic assumption in this approach is that increase in workers' quality through improved education, improves output. This supports the human capital theory which postulates that education and healthcare of workers ensure greater productivity Olaniyan and Okemakinde, (2008). The augmented Solow model is therefore specified as:

$Y = A\,K^{\alpha}\,(hL)^{\beta}$ . . . . . (iv)

Where, Y=Output level; K=Stock of physical capital; h=Level of Human Capital; L=Labor, measured by number of workers; A=Level of Total Factor Productivity;

α=Elasticity of capital input with respect to output; while β=Elasticity of labor input with respect to output. Econometrically, the model is specified as follows:

$Y = A\,K^{\alpha}\,(hL)^{\beta}\,U$ . . . . . (v)

Harrod-Domar Theory of Economic Growth

The Harrod-Domar theory delineates a functional economic relationship in which the growth rate of gross domestic product (g) depends directly on the national saving ratio (s) and inversely on the national capital/output ratio (k) so that it is written as

$g = s / k.$ . . . . . (v)

The Harrod-Domar model in the early post-war times was commonly used by developing countries in economic planning. With a target growth rate, the required saving rate is known. If the country is not capable of generating that level of saving, a justification or an excuse for borrowing from international agencies can be established. An example in the Asian context is to ascertain the relationship between high growth rates and high saving rates in the cases of Japan and China. It is more difficult to introduce the third building block of a growth model, the labour

and population element. In the long run, growth rate is constrained by population growth and also by the rate of technological change.

This model, developed independently by R.F Harrod and E.V Domar in the l930s, suggests savings provide the funds which are borrowed for investment purposes. The model suggests that the economy's rate of growth depends on:

i. The level of saving.
ii. The productivity of investment i.e. the capital output ratio.

For example, if $10 worth of capital equipment produces each $1 of annual output, a capital-output ratio of 10 to 1 (10:1) exists. A 3 to 1 (3:1) capital-output ratio indicates that only $3 of capital is required to produce each $1 of output annually.

The Harrod-Domar model was developed to help analyse the business cycle. However, it was later adapted to 'explain' economic growth. It concluded that:

i. Economic growth depends on the amount of labour and capital.
ii. As LDCs often have an abundant supply of labour, it is a lack of physical capital that holds back economic growth and development.
iii. More capital (physical and human) generates economic growth.
iv. Net investment leads to more capital accumulation, which generates higher output and income.
v. Higher income allows higher levels of saving.

The key to economic growth is to expand the level of investment both in terms of fixed capital and human capital. To do this, policies are needed that encourage saving and/or generate technological advances which enable firms to produce more output with less capital i.e. lower their capital output ratio.

i. Economic growth and economic development are not the same. Economic growth is a necessary but not sufficient condition for development.
ii. Practically it is difficult to stimulate the level of domestic savings particularly in the case of LDCs where incomes are low.

iii. Borrowing from overseas to fill the gap caused by insufficient savings causes debt repayment problems later.
iv. The law of diminishing returns would suggest that as investment increases, the productivity of the capital will diminish and the capital to output ratio rise.

Endogenous Growth Model

Growth theory advanced again with theories of economists Paul Romer and Robert Lucas, Jr. in the late 1980s and early 1990s. Unsatisfied with Solow's explanation, economists worked to "endogenize" technology in the 1980s. They developed the endogenous growth theory that includes a mathematical explanation of technological advancement.

This model also incorporated a new concept of human capital, the skills and knowledge that make workers productive. Unlike physical capital, human capital has increasing rates of return. Therefore, overall there are constant returns to capital and economies never reach a steady state. Growth does not slow as capital accumulates, but the rate of growth depends on the types of capital a country invests in. Research done in this area has focused on what increases human capital or technological change.

Human Capital Theory

This theory shows how education leads to increase in productivity and efficiency of workers by increasing the level of their cognitive skills. Theodore, Schultz, Gory Bucker and Jacob Mincer introduced the notion that people invest in education so as to increase their stock of human capabilities which can be formed by combining innate abilities with investment in human beings (Babalola, 2000).

Examples of such investments include expenditure on education, on-the-job training, health, and nutrition. However, the stock of human capital increases in a period only when gross investment exceeds depreciation with the passage of time, with intense use or lack of use.

The provision of education is seen as a productive investment in human capital, an investment which the proponents of human capital theory considers to be equally or even more

equally worthwhile than that in physical capital. Human capital theorists have established that basic literacy enhances the productivity of workers working in low skill occupations. They further state that instruction that demands logical and analytical reasoning that provides technical and specialized knowledge increases the marginal productivity of workers in high skill or profession and positions. Moreover, the greater the provision of schooling in the society, consequently, the greater the increase in national productivity and economic growth.

Empirical Literature

As with every theory that has been propounded, people will definitely study them and run tests on them. This has been done with the theories that posit that human capital has an impact on economic growth. These tests, studies and practical on the impact of human capital on economic growth via education and healthcare are as follows: The World Bank (2010) specifies that Ghana has found it difficult to grow her economy in her quest to become a knowledge-based economy because of the challenges faced in the national educational system. According to the report, some major challenges limiting the advancement of Ghana education system are low tertiary enrolment level, teaching with obsolete methods, strikes and administrative hiccups, corrupt teachers asking bribes to pass students, frequent absence of teachers during teaching periods, lack of ICT infrastructure and other teaching methods, and poor funding. The organization categorized these problems into poor access to education, poor quality of education and poor funding of education.

Prior to the study undertaken by the World Bank's (2010), the Ghanaian media had reported that the Ghanaian education system was constrained by several challenges, which included poor funding, poor educational infrastructure, inadequate classrooms, lack of teaching aids (such as projectors, computers, laboratories and libraries), dearth of quality teachers and unfavourable learning environment. Moreover, they pointed that many social vices, such as examination malpractice, and corruption have emerged from the school system. These in addition, compound the problems that impede the nation's ability

to cultivate the kind of people that can serve as tools to facilitate economic improvements.

After studying the modelling approach that adopts the Schumpeter (1973) assumptions of imperfectly competitive product markets and competitive innovation which permits the process of generating technological progress. A study conducted in Indonesia examined the inter-relationship between human capital development and economic growth from the economic crisis experienced in the country. In the study, Akita and Alisjahbana (2002) explained that areas having quality of human resource are able to cope better when facing an economic crisis.

The study reported that the challenge of human capital in Africa is not limited only to low level of education and training, but it also includes the current inability of the country to retain a large proportion of its skilled and professional personnel. Thus, Ghana has been losing a significant proportion of her skilled and professional manpower to other national market and increasingly depending on expatriate for many crucial functions. In his study, Wibisono (2001) included variables such as educational attainment which is measured as successful completion of educational level, life expectancy, fertility rate, infant mortality and rate of inflation. The result of his analysis showed that positive influential variables towards economic growth are education, life span and infant mortality. The study showed that human capital in the form of education especially, is the most important contributor to economic growth. According to Wibisono (2001), the Indonesia Human Development report also confirms that there indeed exists a bilateral tie between human capital development and economic growth.

Ramirez and Stewart (1998) explained that although there are bilateral ties between human capital resource and economic growth, specific factors to link them still lacks in the aspect of systematic exploration. In their study, they show that high level human resource capital development will affect the level of the economy through population's increase in their capacity, productivity and creativity. The population's education will determine their ability to absorb and organize all economic growth resources such as technology usage or technological innovation.

Mankiw et al. (1992), Barro and Sala-I-Martin (1995) and Barro (1996a, b) in their studies found that schooling periods or education correlates positively with economic growth. The studies also show that, by using a more detailed filter measure on skill, a country whose literacy level is as much as 1% higher than the average experiences an increase of as much as 1.5% in gross domestic product (GDP) growth per capita which leads to economic growth in turn. A recent study by Mansur et al (2009) found that education provides better employment opportunities and thus, increases the level of income of an individual. Therefore, education is perceived to be an important factor in human capital formation.

The study also found that a correlation exists between education investment among women and fertility. In Africa, educated women are able to get higher wages, and tend to have educated children.

A study of the joint development of government expenditures and economic growth in 23 OECD countries conducted by Lamartina and Zaghini (2007) showed that there is a structural positive correlation between public spending and per capita GDP. Thus an increase in government's spending on human capital development is expected to culminate in an increase of per capita output. Ogujiuba and Adeniyi (2004) examined the impact of government education expenditure on economic growth. Their result showed a statistically significant positive relationship between economic growth and recurrent expenditure on education, while capital expenditure was wrongly signed and not significant in its contributions. Lawanson (2009) took this study further by including both the health and education expenditures in her model. Her objective was to examine the role of human capital investment (proxied by total government expenditure on education and health) on economic growth in Ghana.

After regressing GDP on government expenditure on education, government expenditure on health and the enrolment rates, she found out that a clear relationship exists between human capital development and economic growth. However, unlike the study by Ogujiuba and Adeniyi (2004), the study did not disaggregate expenditure figures on health and education into the recurrent and capital components. His result shows that human

capital investment as a share of real output has positive but statistically insignificant effect on the growth rate of real GDP. He concluded that government expenditure had no significant influence on economic growth in Ghana based on his analysis, which reveals that the variables have not maintained a uniform pattern in the period of study owing to persistent random shock effect on the time series. He reported that the rate of government expenditure to real GDP has been rising since the Structural Adjustment Programme (SAP) without significant contribution to economic growth in Ghana. This he attributed to lack of government monitoring of the contract awarding process of capital projects, ineffective deployment of government funds to productive activities, and lack of transparency and accountability by the government on government spending. Bratti et al (2004) estimated a model of economic growth and human capital accumulation based on a sample of countries at a different stage of development.

Their result revealed that the increase in the primary and secondary level of education contributes to an increase in productivity. They posit that human capital accumulation rates are affected by demographic variables. For example, they established that an increase in life expectancy at birth brings about an increase in secondary and tertiary education while a decrease in the juvenile dependence rate negatively affects secondary education. Finally, they added that geographic variables have a considerable importance in the human capital accumulation process. Nevertheless, studies differed on the impact of human capital on productivity growth.

Park (2004) empirically investigates the growth implication of dispersion of population distribution in terms of educational attainment levels. Based on a pooled 5-year interval time-series data set of 94 developed and developing countries between 1960 and 1965, the study finds that the dispersion index as well as average index of human capital positively influences productivity growth. They conclude that education policy that creates more dispersion in the human capital will promote growth. Loening (2002) investigates the impact of human capital on economic growth in Guatemala through the application of an error correction methodology. He examined two different channels by

which human capital is expected to influence growth. The result from his study revealed that a better-educated labour force appears to have a positive and significant impact on economic growth both via factor accumulation as well as on the evolution of total factor productivity.

Uwatt (2002) empirically examined the impact of human capital on economic growth, using five variants of the original Solow Model linking physical capital, labour and human capital proxied by total enrolment in educational system to real Gross Domestic Product. The result showed that physical capital exerted a positive and very statistical impact on economic growth. Its coefficient was statistically different from zero at 5% significant level. Labour force that entered all the models in log form had also positive but statistically insignificant effect on economic growth.

Ndiyo (2002) on the "Paradox of Education and Economic Growth in Nigeria" modelled for contribution of education growth. He considered real growth of the gross product (RGDP) as respondent variable and gross fixed capital formation (GFCT), aggregate labour force (LAF) and real budget allocation to education (REDUB) as explanatory variables. He estimated the models in both level form and in logarithmic form respectively. From the two sources, it was observed that the growth of real gross domestic product (RGDP) is positively affected by the amount of physical capital and labour inputs in all the specifications but in most cases they have insignificant effects. He observed that contrary to a priori expectations, the estimate for the impact of growth in educational capital on the growth of real Gross Domestic Product was consistently negative.

That growth in educational capital crowds-outgrowth of GDP was a puzzle. However, Ndiyo is not alone in this position. Kyriacon (1980), Lan et al. (1991) and Dasgupta and Weale (1992), seem to agree to this argument.

Ram (1986) using a sample of 115 countries, found government expenditure to have significant positive externality effects on growth particularly in the developing countries sampled but total government expenditure had a negative effect on growth. Devaragam *et* al. (1996) using a sample of 14 OECD countries found that spending on health, transport and communication have positive impact. In majority of the studies, total government

spending appears to have a negative effect on growth (Roman, 1990; Alexander, 1996; Folster and Lai, 1999).

Other studies analyzed the effects of health on growth by using demographic indicators – fertility rate, fertility pattern and mortality rate or examining the consequences of AIDS on economic development. They showed that a decline in fertility enabled more women to take up employment and helped to improve the health and nutrition of the children. Having fewer children reduces the number of dependent persons in the family and makes it possible to invest more in the human capital of children through health and education.

Using panel data of African countries from 1990 to 2002, examined the effect of public expenditure on educational enrolment with illustration from Nigeria and other SANE (South Africa, Algeria, Nigeria, and Egypt) countries at the primary and secondary school levels. The results show that government expenditure on education has a positive and significant direct impact on primary and secondary education enrolment rates.

Based on cross-sectional data for developing countries, Baldacci et al. (2003) found that social spending is an important determinant of education outcomes. This study found that the effect of social spending on education outcomes is stronger in cross-sectional samples than when the time dimension was added. They also found that education spending has a greater effect on social indicators than health outlays. Empirical studies conducted in many developed and developing countries establish a strong negative correlation between a mother's education and fertility and a positive correlation between a mother's education, her child's health and her own health.

Empirical studies on the impact of health are based on a methodology that entails using the panel data of certain countries and regressing the per capita GDP growth rate to the initial level of health and of the variables that are supposed to influence the equilibrium (economic policy, institutional policy, educational policy and other variables). One of the better known and most influential contributions to growth literature is the study by Mankiw et al. (1992), who used an augmented Solow model to explain cross country differences in income levels from 1960 to 1985 but without the materials input variable, explains over 70%

of the variation in income per capita across a large sample of countries. Human capital, as proxied by secondary school enrolment ratios, accounts for almost half the difference in per capita incomes. For non-oil countries, a 1% increase in the average percentage of the working-age population in secondary school is estimated to lead to a 0.66 % increase in long-term income per capita.

In the early (1990) pioneering econometric studies (based on international panel data for a widely diverse array of countries during the post 1960) provided empirical support for the conclusion that capital formation was among the factors that significantly affected the aggregate level rate of economic growth:

i. They found that success in the process of catching up internationally in terms of GDP growth was positively related to the overall social rate of human capital formation.
ii. Furthermore, the poor countries that were tending to catch up with higher income economies were restricted to those that were maintaining levels of investment in formal education which were high in relation to their respective GDP levels.

Summary of Literature

Generally, these are the views of the various economic theorists as regards the impact of human capital on economic growth: The endogenous growth theorists like Paul Romer and Robert Lucas Jnr. believed that human capital accumulation was really necessary for economic growth of any country and there was not going to be any steady rate of economic growth, the economy will continue growing and technology comes secondary to human capital accumulation; the neoclassical growth theorists/exogenous growth theorists like Robert Solow and Trevor Swan believed that technology is more important than human capital accumulation in propelling any country to economic growth and Harrod and Domar delineates a functional economic relationship in which the growth rate of GDP (g) depends directly on the national saving ratio (s) and inversely on the national capital/output ratio (k).

Therefore, in order to add my contributions to already existing studies, the Augmented Solow Model will be adopted for this study.

Restating the augmented growth model i.e. equation 3:

$Y = A\,K^{\alpha}\,(hL)^{\beta}$ . . . . . (iv)

In order to suit the Ghanaian context which is our case study, some adjustments and modifications will be made to accommodate other crucial variables. These crucial variables that will be introduced and accommodated include Life Expectancy Rate (LER), government's capital and recurrent expenditure on education (EDE) and government's capital and recurrent expenditure on health (PHE). These two variables are incorporated to capture government's investment in human capital development since this study is focused on government's investment in human capital development and its effect on economic growth. (h) will be taken away because we cannot really use total school enrolment rate to measure the impact of human capital on economic growth in Ghana; we would rather use Life Expectancy Rate (LER) as a proxy of human capital. The new expanded model is thus stated as follows:

$GDP = \alpha_0 + \beta_1 EDE + \beta_2\ LER + \beta_3 LF + \beta_4 PHE + u$

Where,

Output level is represented by real Gross Domestic Product (GDP).

LER is the Life Expectancy Rate.

LF is the total labor force.

It is expected that each of the explanatory variables would exhibit positive relationship with the dependent variable.

METHODOLOGY

This chapter presents the methodology adopted in this study. Sections covered in the chapter include data, the research design, model specification and variable selection. The model specified discusses the econometric tools used to analyse data for the purpose of answering the research questions. It includes the approach adopted to examine data for the chosen variables and the construction of empirical models.

Research Design

The research design in study is modelled after what has been commonly employed in the existing literature on the impact of human labour on economic development (including Schultz,1975;Solow,1956;Romer,1990;Mankiw,1992;Nelson,1996;Olaniyan,2008).The study employs OLS (ordinary least squares) regression to perform the empirical analysis.

Model Specification

$GDP = f(EDE, LER, LF, PHE, u_i)$ . . . . . (i)

$GDP = \alpha_0 + \beta_1 EDE + \beta_2 LER + \beta_3 LF + \beta_4 PHE + u$ . . . . . (ii)

Where,

GDP is gross domestic product.

EDE is summation of capital and recurrent expenditure on education.

LER is life expectancy rate.

LF is the total labour force.

PHE is public health expenditure (summation of capital and recurrent expenditure on health).

α is the intercept of the function.

β_1, β_2, β_3 and β_4 are the regression coefficients.

μ is the error term which indicates the proxies or other factors that affect GDP but weren't used in our study either because they are irrelevant or they are not estimates of human capital.

Transforming the above equation into log form because we have to standardize the regressand and regressor in order to interpret the results in a better way, we now have the equation as this:

$Ln\ GDP = \alpha_0 + \beta_1 LnEDE + \beta_2 LnLER + \beta_3 LnLF + \beta_4 LnPHE + u$ . . . . . (iii)

Model Estimation

Ordinary Least Squares (OLS) regression technique which is a form of multiple regressions will be used in this study to find out the impact of human capital on economic growth. Furthermore, the Newey-West method will be applied to correct for autocorrelation as well as heteroskedasticity that may fault the inferences that will be derived from the study. The motivation for

adopting Newey-West is because the adjustment procedure produces heteroskedasticity and autocorrelation consistent (HAC) standard errors.

In this empirical investigation, we will adopt the *Ordinary Least Squares* (OLS) method attributed to *Carl Friedrich Gauss*, a German mathematician. The method of least squares is one of the most powerful and popular methods of regression analysis, it is a method of estimating the unknown parameters in a linear regression model. OLS method minimizes the sum of squared vertical deviations between the observed responses in the dataset and the responses predicted by the linear approximation. The resulting estimator can be expressed by a simple formula, especially in the case of a single regressor on the right-hand side.

The OLS estimator is consistent when the regressors are exogenous and there is no multicollinearity and optimal in the class of linear unbiased estimators when the errors are homoskedastic and serially uncorrelated. Under these conditions, the method of OLS provides minimum-variance mean-unbiased estimation when the errors have finite variances. Under the additional assumption that the errors be normally distributed, OLS is the maximum likelihood estimator. It is known for possessing the Best Linear Unbiased Estimator (BLUE) properties.

OLS holds some assumptions:

a) μ is a real random variable
b) The mean value of the error term (μ) in any particular period is zero (μ) = 0.
c) The variance of the error term is constant in each and every period.

Data Sources and Types

Secondary data collected from the World Bank, Bank of Ghana (BOG), Ghana Statistical Service, and Journals of Economic Studies will be used in this study. This study is carried out from 1970 to 2010, as these are the years the study is focused on.

Economic A priori Expectation

This research study looks at the impact of human capital on economic growth in Ghana. A priori economic theory

postulates that explanatory variables of GDP must satisfy certain conditions. It is expected that labour force, life expectancy, education expenditure (capital and recurrent) and public health expenditure (capital and recurrent) would have a positive impact or positive relationship with output, represented by GDP. The independent variables will be measured to find out if they match with economic postulations and signs.

Table 1
The independent variables and their economic postulations and signs.

Regressor	Coefficients	Expected Sign
Education Expenditure (Capital and Recurrent)	β_1	Positive +
Life Expectancy Rate	β_2	Positive +
Total Labor Force	β_3	Positive +
Public Health Expenditure (Capital and Recurrent)	β_4	Positive +

Evaluation of Estimates

An evaluation of the model consists of evaluating if the estimated co-efficient satisfy the necessary criteria, both theoretically and statistically. Therefore, it is necessary for this study to satisfy the following:

a) Statistical criteria (first-order test).
b) Econometric criteria (second-order test).

Statistical Criteria

Statistical criteria, which is also known as the first-order test estimates the statistical reliability of the estimated parameters of the model. To conduct a first-order test, we have the following:

a) F-statistic.

b) T-statistic.
c) Co-efficient of determination (R^2).
d) Adjusted R^2.
e) Standard error.
a) F-statistic

This is known as the f-test, a term coined by George W. Snedecor, in honour of Sir Ronald A. Fisher, who initially developed the statistic as the variance ratio in the 1920s. F-test is a statistical test in which the test statistic has an f-distribution under the null hypothesis. It is often used when comparing statistical models that have been fit to a data set, in order to identify the model that best fits the population from which the data were sampled. Exact F-tests mainly arise when the models have been fit to the data using least squares.

It is used to test whether or not there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the F table value, then there is a significant impact between the dependent and the independent variables in the regression equation and if the calculated F is smaller or less than the F table value, there is no significant impact between the dependent and the independent variable.

If the probability at which the f calculated is significant, we reject the null hypothesis (H_0) and accept the alternative hypothesis (H_1) which shows that the regression is significant. But if the probability at which the f calculated is significant in the regression result, it means that the overall regression is insignificant.

b) T-statistic

T-test aka Student's t-test was introduced in 1908 by William Sealy Gosset, a chemist working for the Guinness brewery in Dublin, Ireland ("Student" was his pen name).
It is any statistical hypothesis test in which the test statistic follows a student's t distribution if the null hypothesis is supported.

T-test is mostly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known. When the scaling term is unknown and is replaced by an estimate based on the data, the test statistic

(under certain conditions) follows a student's t distribution. Here, the absolute t-value of each coefficient is compared with 1.96 and if greater than 1.96, such variable possessing the coefficient is accepted as statistically significant and fit to be used for inferences and possibly for forecasting.

If the probability at which t calculated is significant in our regression result to our chosen level of significance (0.05), we reject the null hypothesis (H_0) which says that the independent variable is not significant. This invariably means accepting the alternative hypothesis (H_1) which states that the independent variable is statistically significant in our model.

c) Co-efficient of Determination (R^2)

The coefficient of determination, R^2 is used in the context of statistical models whose main purpose is the prediction of future outcomes on the basis of other related information. It is the proportion of variability in a data set that is accounted for by the statistical model. It provides a measure of how well future outcomes are likely to be predicted by the model. The R^2 denotes the percentage of variations in the dependent variable accounted for by the variations in the independent variables. Thus, the higher the R^2, the more the model is able to explain the changes in independent variable. Hence, the better the regression based on ordinary least square (OLS) techniques and this is why the R^2 is called the co-efficient of determination as it shows the amount of variation in the dependent variable explained by explanatory variables. However, if R^2equals one, it implies that there is 100% explanation of the variation in the dependent variable by the independent variable and this indicates a perfect fit of regression line.

While where R^2 equals zero, it indicates that the explanatory variables could not explain any of the changes in the dependent variable. Therefore, the higher and closer the R^2 is to 1, the better the model fits the data.

d) Adjusted R^2

Adjusted R^2 is a modification of the coefficient of determination, R^2. It adjusts for the numbers of explanatory terms in a model. Unlike R^2, the adjusted R^2 increases only if the new

term improves the model more than would be expected by chance. The adjusted R^2 can be negative and will always be less than or equal to R^2 i.e. Adjusted R^2 less than/equal R^2. It can also be said to be the amount of variance in the outcome that the model explains in the population.

e) Standard Error

This is the standard deviation of the sampling distribution of a statistic. The term may also be used to refer to an estimate of that standard derivation, derived from a particular sample used to compute the estimate.

Economic Criteria

Econometric criteria, which is also known as the second-order test estimates that the assumption of econometric method employed are satisfied or not in any particular case. They determine the reliability of statistic criteria and also establish whether the estimates have desirable properties of unbiasedness and consistency. The economic criteria also tests validity of non-auto correlation disturbances, hence the Durbin-Watson (D-W) statistic is used for the test.

$$DW = \frac{\sum [wt\ (et - 1)2}{(et)2}$$

The Durbin-Watson test has the following criteria:

- If d* is approximately equal 2 i.e. d* = 2, we accept that there is no autocorrelation in the function.
- If d* = 0, there exist perfect positive auto-correlation. Furthermore, if O < d* < 2, that is if d* is less than two but greater than zero, it denotes that there is some degree of positive autocorrelation which is stronger, the closer d* is to zero.
- If d* is equal to 4 i.e. d*=4, there exist a perfect negative auto-correlation while if d* is less than four but greater than two i.e. 2 < d* < 4, it means that there exist some degree of negative autocorrelation, which is stronger the higher the value of d*.

OLS technique has a crucial assumption that residuals are homoskedastic in nature. Violation of this assumption leads to standard errors and t-values that are biased. Such bias leads to wrong as well as faulty conclusions regarding the statistical significance of the OLS estimates. Therefore in confirming that the residuals possess a homoskedastic residual variance (constant residual variance), we employ the White test and accept the null hypothesis that there is homoskedasticity (i.e. no heteroskedasticity) if the calculated test static (χ^2 or F) is less than the critical value. Also if the probability of the calculated test-statistic (χ^2 or F) is greater than the 0.05 level of significance chosen in the study, the null hypothesis will be accepted.

Description of Variables

The variables used for this study are EDE, LER, LF and PHE.

EDE is Education Expenditure which includes capital and recurrent government expenditure on education.

LER is Life Expectancy Rate which means the average number of years a person will live as determined by mortality in a specific geographic area. It is also known as expectation of life.

LF is Labour Force which means the total amount of able and willing number of individuals who have jobs in an economy.

PHE is Public Health Expenditure which includes capital and recurrent government expenditure on health.

DATA ANALYSIS, RESULTS AND INTERPRETATION

This Chapter presents the results as well as the empirical findings of the study. The data was collected and analysed based on the objectives set and research questions raised in this study. The study intended to assess the impact of human capital on economic development. In giving life to our model specified in the previous chapter, the study employs Ordinary Least Squares (OLS) method alongside Newey-West method.

The need for Newey-West follows crucial observation of bias that autocorrelation and heteroskedasticity (which are the two

second order tests employed in the study) can impose on the standard errors and t-values of our estimated coefficients. However Newey-West method produces heteroskedastic and autocorrelation consistent (HAC) standard errors. Therefore to ensure that the crucial properties of (BLUE) of our OLS methodology are retained, and also to hedge against wrong inferences, we employ alongside OLS, the Newey-West method. The analysis is carried out using EVIEWS 3.1 Econometrics software. The results of analysis, following the methodology explained is presented in details below.

Results

Recall the regression model in log form:

$\text{Ln GDP} = \alpha_0 + \beta_1\text{LnEDE} + \beta_2\text{LnLER} + \beta_3\text{LnLF} + \beta_4\text{LnPHE} + u$

Table 4.1

Regression Result with Newey-West adjustment (as seen in the annex)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-82.38233	7.689406	-10.71374	0.0000
LNEDE	-0.181989	0.259562	-0.701139	0.4877
LNLER	5.093514	1.844261	2.761818	0.0090
LNLF	4.515785	0.342378	13.18948	0.0000
LNPHE	-0.142448	0.214833	-0.663064	0.5115

Inclusive are the other various test results and information that will be of importance in this chapter:

Dependent variable = LnGDP

$R^2 = 0.958459$

Adjusted $R^2 = 0.953844$

F-Statistics = 207.6556

Probability (F-Statistic) = 0.000000

Durbin Watson = 1.088358

With this in mind, the regression result will now be substituted in the model above. Therefore, applying Newey-West to OLS methodology, the following findings were observed:

$\text{Ln GDP} = -82.38 - 0.18\beta_1\text{LnEDE} + 5.09\beta_2\text{LnLER} + 4.52\beta_3\text{LnLF} - 0.14\beta_4\text{LnPHE}$

(10.71) (0.70) (2.76)
(13.19) (0.66)

Values in parentheses represent the t-statistic for the corresponding coefficients.

Evaluation of Results

Economic A priori Results

From the mathematical regression result stated above, it can be seen that capital and recurrent expenditure on health and education (PHE & EDE) yields a negative relationship with GDP; on the contrary, labour force and life expectancy rate (LF & LER) yields a positive relationship with GDP.

We already have an economic a priori expectation in chapter 3.4; hence we will recall it here to see if it is in order with our mathematical regression result.

Table 4.2

comparing the a priori expectation to the regression result

Regressor	Coefficients	Expected Sign	Regression Result
Education Expenditure (Capital and Recurrent)	β_1	Positive +	Negative -
Life Expectancy Rate	β_2	Positive +	Positive +
Total Labor Force	β_3	Positive +	Positive +
Public Health (Capital and Recurrent)	β_4	Positive +	Negative -

From the table above, we see that our results (regression result and economic a priori expectation) are not in conformity with each other because the signs for EDE (Education Expenditure) and PHE (Public Health Expenditure) are positive in the economic a priori expectation but negative in the regression result.

Statistical Criteria

F-statistic which is also known as the f-test is used to test whether or not there is a significant impact between the dependent and the independent variables. In the regression equation, if calculated F is greater than the F table value, then there is a significant impact between the dependent and the independent variables in the regression equation and if the calculated F is smaller or less than the F table value, there is no significant impact between the dependent and the independent variable.

We run the f-test with 0.05 significance. Therefore,

$F_{0.05}$ (k-1, d.f)

Where k-1 = (No of parameters) – 1. Parameters here refer to the variables used in our regression analysis.

d.f = Degree of freedom which is calculated as: n-k = (No of sample) – (No of parameters)

We have 5 variables in our study (independent variables and dependent variable inclusive): GDP, EDE, LER, LF, PHE.

Hence, k-1 = 5-1= 4

d.f = 41-5= 36

$F_{0.05}$ (k-1, d.f) = $F_{0.05}$ (4, 36) = 2.61

Calculated F-value = 207.6556

From the foregoing results of our f-calculated and f-statistic results i.e. 207.6556 and 2.61 respectively, we can safely say (as deduced from the result above) that our f-calculated is higher than our f-statistic because 207.6556 is greater than 2.61 (207.6556 > 2.61), hence our estimated model is significant. Also, cross-checking with the probability of the f-statistic which is 0.0000, we see that it is less than the level of significance which is 0.05: 0.0000 < 0.05.

T-test is mostly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known. Here, the absolute t-value of each coefficient is compared with 1.96 (because we are making use of 0.05 level of significance) and if greater than 1.96, such variable possessing the coefficient is accepted as statistically significant.

To get the value of 1.96, we calculate thus:

$t^*/_2 = t_{0.05}/_2 = t_{0.025}$

From the t-table, $t_{0.025}$ is represented as: ±1.960 ~ ±1.96

Comparing the t-table value = ±1.96 with the values of EDE, LER, LF, PHE, we have: -0.701139, 2.761818, 13.18948, -0.663064, we see that-0.701139 < ±1.96 which means that EDE (Education Expenditure) is non-significant;
2.761818 > ±1.96 which means that LER (Life Expectancy Rate) is significant; 13.18948 > ±1.96 which means that LF (Labour Force) is significant;
-0.663064 < ±1.96 which means that PHE (Public Health Expenditure) is non-significant.

Yet again, looking at the probability values of EDE, LER, LF, PHE (Education Expenditure, Life Expectancy Rate, Labour Force, Public Health Expenditure): 0.4877, 0.0090, 0.0000, 0.5115, we see that the probability value of EDE (Education Expenditure) is greater than the level of significance i.e. 0.49 (when approximated to 2 decimal places) > 0.05; the probability value of LER (Life Expectancy Rate) is less than the level of significance i.e. 0.009 (when approximated to 3 decimal places) < 0.05; the probability value of LF (Labour Force) is less than the level of significance i.e. 0.00 (when approximated to 2 decimal places) < 0.05; the probability value of PHE (Public Health Expenditure) is greater than the level of significance i.e. 0.51 (when approximated to 2 decimal places) > 0.05. This probability value result in comparison with the level of significance conforms to the t-table value result in comparison with the t-calculated.

From the above comparison, we can see that we obtained the same results as gotten from our economic a priori expectations and economic a priori results.

From our OLS regression result, our co-efficient of determination (r^2) is 0.958459 which means that at 95.85%, the explanatory/independent variables (Education Expenditure, Life Expectancy Rate, Labour Force and Public Health Expenditure) really explains the changes in the dependent variable, Gross Domestic Product (GDP) and this shows that only 4.15% are explained by exogenous variables that aren't real proxies of GDP.

From our OLS regression result, our adjusted r^2 is 0.953844 which means that at 95.38%, the explanatory/independent variables (Education Expenditure, Life Expectancy Rate, Labour Force and Public Health Expenditure) really explains the changes in the dependent variable, Gross

Domestic Product (GDP) and this shows that only 4.62% are explained by exogenous variables that aren't real proxies of GDP. By examining the figures of r^2 and adjusted r^2 (95.85% and 95.38% respectively), it can be observed that they have almost similar figures asides 0.47% disparity (this is in conformity with the rule between r^2 and adjusted r^2 that states that the adjusted r^2 can be negative and will always be less than or equal to r^2 i.e. Adjusted $r^2 \geq r^2$). This shows that the adjusted r^2 has the same view of the effect of the independent variables on the GDP as the r^2 has. With this in sight, we can safely deduce and say that our estimated model has a strong goodness of fit.

Economic Criteria

From our OLS regression result captured in table 2 annex, the Durbin-Watson statistic is 1.088358 which cannot be approximated to 2; hence, the presence of positive autocorrelation in our result. This autocorrelation however, does not bias the standard errors and t-values of the respective variables, given that the Newey-West HAC standard errors are employed.

Table 4.3
White Heteroskedasticity Test

F-statistic	2.546964	Probability	0.019000
Obs*R-squared	23.71094	Probability	0.049641

The f-statistic and observed r^2 are 2.546964 and 23.71094 respectively and their probability values are 0.019000 and 0.049641 respectively which are both less than the 0.05 level of significance. With this result, we reject the null hypothesis of non-heteroskedastic residual variance. This goes to show that the variances of the residuals are not constant. Non-constant residual variance, like in the case of autocorrelation, can impair the result of our OLS technique. However, to hedge against this outcome and prevent the observed autocorrelation and heteroskedasticity from yielding biased standard errors and t-values, the Newey-West method is employed alongside OLS. This is aimed at neutralizing the effect of both heteroskedasticity and

autocorrelation on the t-values. As such, with Newey-West, our inferences regarding the statistical significance of variables remain valid not minding the presence of autocorrelation and heteroskedasticity.

Discussion of Findings

From our OLS regression above, the variables that impacts directly positive on the economic growth of Ghana are LER (Life Expectancy Rate) and LF (Labour Force) whereas EDE (Education Expenditure) and PHE (Public Health Expenditure) impacts inversely i.e. negatively on the economic growth of Ghana. We shall examine the reasons for this positive and alternative effect on economic growth by the LER (Life Expectancy Rate) and LF (Labour Force), EDE (Education Expenditure) and PHE (Public Health Expenditure) respectively.

Life Expectancy Rate: Practically and according to economic a priori expectation, high life expectancy rate leads to high human capital growth which makes economic growth possible. When there is life, an individual can go to work and be productive but when the same individual dies, he cannot go to work and be productive, hence a high life expectancy rate as a proxy of human capital leads to more economic growth in a country. From our regression result, life expectancy rate is significant and evident in Ghana.

Labour Force: From our economic a priori expectation, the labour force in any economy is expected to add up to economic growth because they are the individuals that are able and willing to be work; work leads to output which translates to being productive with the resources available. When the labour force is healthy and have a high life expectancy rate, they are capable of propelling the economy (in which they find themselves) to greater economic growth. From our regression result, the relationship between labour force and economic growth in Nigeria is positive which is in conformity with the economic a priori expectation of labour force vis-à-vis economic growth.

Education Expenditure: From our economic a priori expectation, it is expected that education expenditure in any economy should have a positive relationship with economic growth in the same country; however, our regression result shows

that there is a negative relationship between government's education expenditure (capital and recurrent) and economic growth in Ghana. This is against the economic a priori expectation and status quo but the problem is derivable from many reasons among which are: the government's expenditure on education are just monetary allowances which are misallocated and misappropriated by agents and people who handle the education sector (in the words of Ayara (2002), "educational capital has gone into privately remunerative but socially unproductive activities)", there is low funding capacity on human capital harnessing and development; there are no checks and balances on the contracts awarded as a result of capital expenditure on education which are necessary for the provision of ICT infrastructure, well-equipped laboratories, projectors, digital libraries, etc.; poor access to education and poor quality of education whereby education gotten at the national, state or local level in Ghana is ata-par with the standard in the international community; the teachers are not properly educated as most of them show lackadaisical attitude to teaching because their major focus is not to pass knowledge but to pass time and collect salary at the end of the month. All these are the reasons why education expenditure in Ghana is negative from our regression result (and couldn't meet up with the economic a priori expectation).

Public Health Expenditure: From our economic a priori expectation, it is expected that health expenditure in any economy should have a positive relationship with economic growth in the same country; however, our regression result shows that there is a negative relationship between government's health expenditure (capital and recurrent) in Ghana and economic growth. This is against the economic a priori expectation and status quo but the problem is derivable from the fact that the capital funds which are supposed to be used in building healthcare clinics and institutions in Ghana are mismanaged and channelled into private use by those in charge of the healthcare sector in Ghana. This leads to the issue of few or no healthcare clinics or institutions in the country; furthermore, it leads to the situation whereby the recurrent expenditure are not well channelled even in the few established healthcare clinics or institutions because of embezzlement and lackadaisical attitude by healthcare officials and this leads to lack

of well-staffed health clinics and institutions including lack of necessary health equipments (thermometers, dental tools, electricity, standby generators, incubators, water supply, laboratory equipments, surgical instruments, etc.).

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

Chapter five presents summaries of the study, conclusion reached in the study as well as recommendations suggested. The conclusion was reached based on the key findings of the study and suggested recommendations put forward based on the conclusions reached in this study. The main objectives of the study were to;

(i) Determining the level of human capital investment in Ghana.
(ii) Determining the impact of human capital on economic growth in Ghana.

Summary of Findings

The summary of literature in Chapter 2, section 3 shows us that the Augmented Solow Model was adopted to test for the impact of economic growth in Ghana; this model: the Augmented Solow Model was modified to suit the Ghanaian context and this modification involved excluding some variables (Physical Capital, Literacy Rate) and including more specific variables (Capital and Recurrent Education and Health Expenditure) that relates well to the sphere of the Ghanaian economy. An OLS regression test was run on the data to determine the extent of the impact of human capital (proxied by LER: Life Expectancy Rate) on economic growth spanning the period 1970-2010; Newey-West method was also applied to reduce the adverse effect of the positive autocorrelation (discovered via the Durbin-Watson result) on the standard error.

What we discovered was that the variables: Education Expenditure (EDE), Life Expectancy Rate (LER), Labour Force (LF) and Public Health Expenditure (PHE) were indeed a sine qua non to economic growth in Ghana although Education Expenditure (EDE) and Public Health Expenditure (PHE) proved non-significant in Ghana as a result of some factors which were

carefully explained in Chapter 4, section 6. This led us to accept the first null hypothesis (there has not been significant human capital investment in Ghana over the period 1970-2010) and reject the alternative hypothesis; on the other hand, it led us to reject the second null hypothesis and accept the alternative (human capital has a significant impact on economic growth in Ghana).

Conclusion

The study concludes that, on the basis of the economic a priori expectation and our regression result, we discovered that the impact of human capital on economic growth in any economy is indeed a huge one both in the short-run and long-run, most especially in the long-run but in the Ghanaian economy, there is an ironical understanding of the impact of human capital on economic growth in Ghana because while the government believes in the significance of human capital in propelling economic growth, it has not properly invested on human capital in the capital and recurrent sphere. This is not a good indicator or pointer to higher economic growth in Ghana because it has a negative spill-over effect to the growth of all sectors in the economy. Therefore, to guard against the negative effect of non-significant human capital investment and the non-contribution of human capital to economic growth in Ghana requires efficient and effective monitoring of capital and recurrent expenditure implementation processes and proper utilization of funds on the capital and recurrent basis. Human capital is a necessary and sufficient condition for the economic growth of Ghana because when individuals are harnessed and developed, they are able to bring forth output (materially, socially, productively) which adds up to the economic growth.

Recommendations

Recommendations are made to curb or reduce to a significant ratio, the loopholes in policies and realities in life which are not well matched up to the economic a priori expectations. From our regression results and tests of hypothesis above, we saw that human capital was recognized as a valuable tool in propelling Ghana to economic growth yet proper implementation of investment by the government in some areas of

the education and health sectors and investment by the government in other areas of the same sectors (such as investment in the Research &Development area of education) was and is still found wanting. With this in mind, it is necessary and crucial to recommend some policies to curb or reduce to a huge extent the lapses discovered.

Ghana currently occupies the 95th position on the Index of Economic Freedom (Terry Miller). Why is this? This is because a country that doesn't place Research & Development, popularly known as R&D as its top priority will amount to nothing both in the long- run and short- run. Ghana should focus more on R&D because it leads to innovation, invention and technological advancement. As seen in the national budget, there is no or little provision for this. The World Bank (2010) is of the view that government funding for university research is too low to attract partners in the economic and business work environment into R & D agreements. Provision of budgetary allowance (for R&D) and allocation, including proper implementation should be established. By proper implementation, it means establishment of R&D facilities for various sectors all over the country and ensuring that they are well-equipped and manned by skilled personnel.

One of the major concerns in the Ghanaian educational system is the challenge of integrating new knowledge into academic courses and programmes. The system operates on obsolete knowledge, thus finding it difficult to embrace new knowledge and discoveries. This leads to production of graduates' who find it difficult to fit into the world of work, since their acquired knowledge and skills are rarely relevant to the needs of employers of labour services. This problem is the result of lack of connection between the academia and the business work environment (World Bank, 2010), which has impeded the nation's capacity to build the critical mass of human capital required to facilitate growth. Speaking from the viewpoint of research and experience, the school curriculum (especially the tertiary institutions' curriculum) needs revision because human capital can't be properly developed if outdated knowledge is still being given to individuals who will be the leaders of tomorrow.

Accounting students shouldn't be taught manual book-keeping any longer but should be introduced to automated accounting software's such as Peachtree Accounting software; Economics students shouldn't be taught econometrics on the theoretical level only but should be taught econometrics with EVIEWS, SPSS, etc. (they should know how to run their regression tests, heteroskedastic tests and other tests with these economic software's). That is how human capital is developed and not sticking to the old traditional method that has been phased out centuries back. This applies not only to Accounting and Economics but to other fields like Engineering, Sociology, etc. If the lecturers on seat are incapable to handle this change, they should be retrained to fit into this and if they remain incapable or adamant to learn, they should also be revised.

What applies to the Ghana education sector on the issue of allocation, disbursement and implementation of budgetary allowances also applies to the Ghanaian health sector; WHO's specification for low income countries of $34 per capita to be spent on healthcare should be met.

The preponderance of health-related problems could be attributed to the observed shortage of skilled medical workers at the level of primary health care (WHO, 2001). Most medical personnel in Ghana are quacks and shouldn't be in the medical field in the first place. Therefore, they should be properly trained to meet up with the international community's standard of healthcare knowledge. This should be done to reduce the presence of quacks in all fields of medicine that affect the human body directly or indirectly: dentistry, kinesiology, optometry, dermatology, emergency medicine, surgery, public health, obstetrics, gynaecology, genetics, general practice, etc. Effective training of these medical personnel in these various fields will lead to a good response time to issues arising in the human body and possible cure or prevention.

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