THE IMPACT OF PUBLIC SECTOR INVESTMENT IN HUMAN CAPITAL ON ECONOMIC GROWTH: A CASE STUDY OF HEALTHCARE AND EDUCATION IN KENYA

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DECLARATION

I declare that this paper is my original work and to the best of my knowledge has not been submitted to any other university or learning institution for academic credits. I undertake that I have adhered to the University's policy regarding academic honesty in completing this research work.

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APPROVAL

This paper is submitted for the award of the degree of Master of Arts in Economics at the University of Nairobi with my approval as the student's University supervisor.

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DEDICATION

I dedicate this research work to my parents Mr. Nathaniel Omia and Mrs. Clementina Awuor for the great interest and support they have provided during my academic endeavors and the sacrifices they have made throughout the academic journey. Most importantly, I dedicate this work to my lovely wife Vivian Colletar and my three daughters; Tinah Tracy, Marymerlyn Hope and Zawadi Adassa for their invaluable support and sacrifices made to allow me sufficient time to complete this research work. Please note that you collectively share in this and all my academic accomplishments**.**

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ACRONYMS

ADF	:	Augmented Dickey–Fuller Test
AIC	:	Akaike information criterion
CE	:	Cointegration Equations
GDP	:	Gross Domestic Product
IRF	:	Impulse Response Functions
KIPPRA	:	The Kenya Institute for Public Policy Research and Analysis
KNBS	:	Kenya National Bureau of Statistics
OLS	:	Ordinary Least Squares
R&D	:	Research and Development
ST&I	:	Science, Technology and Innovation
UN	:	United Nations
VAR	:	Vector Auto-Regression
VECM	:	Vector Error Correction Model

ABSTRACT

This study sought to explore the impact of public sector investment in human capital on economic growth in Kenya. In order to establish the impact specific components of investment in human capital on economic growth, human capital was disintegrated into two major components of education and healthcare. The dependent variable was economic growth expressed as real GDP while expenditure by the government on the two components human capital formed the independent variables. The study utilized time series secondary data sourced from the different Kenya's annual Economic Surveys and Statistical Abstracts by KNBS and data from World Bank database.

The study was anchored on Solow's Swan growth model and used ADF test to check for the presence of unit root and the test found that all study variables were stationary. Johansen (1988) was also utilized in checking for long run correlation between the study variables and it was confirmed that the variables were cointegrated and therefore restricted VAR was estimated. Estimates obtained from restricted VAR were used to derive impulse response functions and variance decomposition analysis and the results used to interpret the impacts of investment in human capital development on education and healthcare on growth of the Kenyan economy. The study found that investment in healthcare and education had a consistently positive impact on the growth of the economy and that such positive impact was felt both in the short-term and long-term. The study therefore recommended that the government through its relevant policy making and budgeting institutions design policies aimed at attracting and improving both public and private sector investments in researched components of human capital to spur growth of the economy and help achieve its development goals as envisioned under Vision 2030 development blue print.

Key Words: Human Capital, Economic Growth, Investments, Solow growth Model, Impulse Response Function, Impact, and Budgeting.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Economic thought as inferred from existing literature has often emphasized on the roles of technological development, market mechanisms as well as institutional organizations as the prime drivers of economic systems, often overshadowing the role of human capital. Nevertheless, it is a generally acknowledged concept that materials that exist in nature are considered resourceful only, when their potential value is defined and recognized by the human mind (Šlaus and Jacobs (2011). Human consciousness and actions of the mind on the other hand generates resources of economic value by discovering productive and innovative relationships between existing elements. According to Goldin (2001), the concept of human capital is the accumulation of knowledge, behaviors and personality traits, including ingenuity that is demonstrated in the ability to execute an undertaking with the aim realizing economic value.

Human capital, like other factors of production, coordinates with physical capital to produce goods and services and as a result, its quality and accumulation, including the levels of skills are critical factors considered when formulating development policy documents Mincer (1981). The development of human consciousness and its cognitive fitness is thus, the real source of wealth creation in an economy. To achieve this enhancement of competency and wellbeing of human capital, targeted investments are often extended by governments in areas of education and healthcare among others. The two dimensions of education and healthcare are fundamental factor inputs that foster human capital to achieve efficiency and effectiveness in production activities and service delivery and thus influence economic growth.

The ability of the workforce to gain and apply relevant knowledge and requisite skills in an environment where healthiness and fitness of the mind and the body is periodically monitored and sustained is critical to the general output. Subsequently, sustained output of quality goods and services both for local and international markets in an environment of quality service provision brought about by a skilled and healthy workforce, foster economic growth and development.

1.1.1 Education and Healthcare Dimensions

According to Schultz (1961), proficiency and knowledge are characteristics of human capital that is a consequence and results of deliberate investment. Schultz further observed that the increase in national output of western countries, is as an outcome of decisive investment in human capital. It

can therefore, be concluded with reasonable and acceptable confidence that individual values and attributes realized through educational enhancements enables the necessary components of an effective workforce that is productive and that energies the wheels of economic growth.

Besides, promotion of entrepreneurship and technological advances are decisive concepts that are premised on education and which raises people's productivity and creativity. Employees possess a variety of skills that are a consequence of either inherited or acquired abilities. The analysis of human capital generally considers the competences that are acquired and instilled through both informal and formal education, training and experience in the employment market. Continual investment in healthcare programmes to better human health constitute a key strategy in the journey for growth and development of a given economy. The thought and evidence thereafter that investment effort in healthcare augments economic growth, reinforces the reasoning behind spending on healthcare, founded on both equity and humanitarian arguments. Economies with better educated and healthier citizenship enjoy a better circumstances of wellbeing particularly in a conducive policy situation, Alleyne and Cohen (2002).

At a micro level, labour forms part of the basic components of growth in an economy. The productivity of labour at macro level changes as a consequence of the rate of output by individual labour. Given the effect of individual health on his/her presence at work and productivity, the change in the average health of a society, has an influence on the total labour productivity and growth of the economy as a whole. According to Erdil and Yetkiner (2009), a healthy workforce and expenditure on healthcare has an aspect of being a precondition to output and subsequently, growth of the economy. Fundamentally, two approaches are utilized in evaluating the consequence of healthcare on growth. These include: estimation from microeconomic studies which is cumulated to standardize the magnitude realized at an aggregate level; and the estimation of the aggregate relationship directly by utilizing macroeconomic data. This study would utilize the second approach given its scope.

In Kenya, the Government under its Vision 2030 development blueprint, identifies transformation and enhancement of human capital through quality healthcare as a key prospect to sustainable development. The country aims to develop a system of quality healthcare embodied with quality standards that reduce health inequalities. In addition, the current strive for universal healthcare is espoused under the Government's Big 4 development agenda of 2017 – 2022. Under education and training, the country through Vision 2030 envisages a relevant and globally competitive quality education and training including research to foster development. This therefore, confirms that the Government in its development trajectory acknowledges the centricity of the two human capital dimensions of healthcare and education to economic growth of the country.

1.1.2 Human Capital and Economic Growth

Generally, growth of an economy is primarily anchored on human resources with critical skills and knowledge relevant to the development agenda and growth trajectory projected for the economy. With limited skills and knowledge therefore, physical capital remains underutilized and the quality of production compromised, leading to high costs of production and eventual collapse of production entities within the economy. According to the World Bank (2018), the wealth of the world is today concentrated less in land, factories, machinery and tools. The skills, resourcefulness and knowledge of the people is as a consequence, increasingly becoming essential to growth of national economies. Further, Nafukho et al, (2005) affirms that skills and knowledge has been at the epicenter of economic development.

On his part, Jhingan (1989) observed that economic parity especially of a given society, remains constrained when there exists little knowledge of; existing natural resources, potential alternative production methods, essential skills, prevailing market conditions and opportunities and credible institutions that might be created to favor economizing effort. According to Schultz (1961), the level of economic output and progress of an economy is dependent on people. According to Baldacci et al (2008), the value and appreciation of human capital is premised on the fact that healthy and more educated and skilled personnel are more efficient and effective in productive activities which cumulates to growth of the economy.

Mincer (1981), stated that the contribution of human resource as an element of production to the framework of economic growth increases in correlation with the increase in the volume of physical capital and reverse is equally true. In addition, aggregate production function framework provides that the growth of human capital is both a consequence and a condition of economic growth. The Government of Kenya spends substantial revenue on education and healthcare programmes whose impact on economic growth ought to be evaluated.

1.1.3 Human Capital and the Kenyan Economy

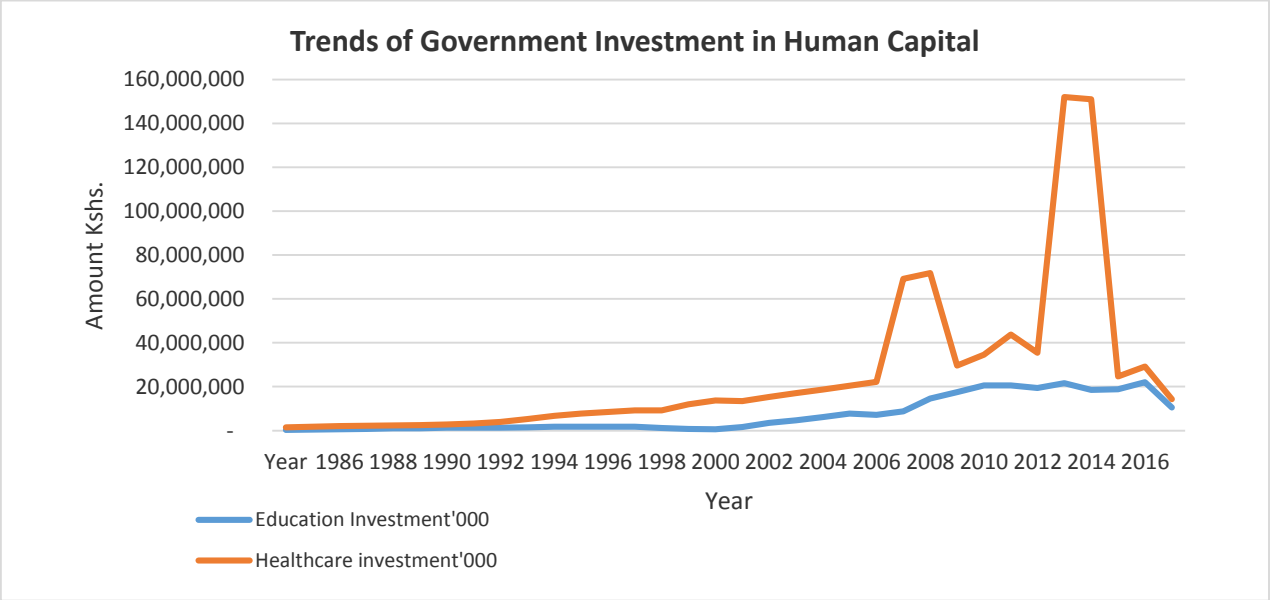
The Government of Kenya, like other governments of developing countries, has since independence faced the fundamental challenge of how to foster growth of the economic and wealth creation through enhancing the competency and wellbeing of its human capital. The major challenges facing Kenya requires a robust and proficient personnel to deliver services of high quality for all citizens while, at the same time utilizing the limited available resources in a sustaining manner.

According to the Report by the World Bank (2018), existence of surplus labor in the Kenyan economy is due to shortage of critical skills. In addition, the underdevelopment of human capital in

the economy is manifest in low productivity, factor immobility, limited specialization in occupation, cultural or traditional based leadership, and limited investment in technology. High quality labor is established in an environment of quality education system that enables tertiary education to provide advanced skills and a workforce that offers premium services at the workplace. Education and training are therefore important factors in greasing the wheels of economic growth and Kenya as a nation must continuously invest in high quality education and training that is required for growth and economic development.

The Government of Kenya allocates financial resources on an annual basis on expenditure programmes and investments targeted towards education and healthcare improvements for its labour force. This is intended to enable efficiency and effectiveness of the labour force to foster the creation of a conducive environment for improved service delivery. Although these investment often incorporates a number of dimensions that are both interrelated and critical to the enrichment of human capital, the major dimension analyzed in this research work is the expenditure on healthcare and education. The trends in expenditure on education and healthcare by the Government over the period under study is shown in **Fig. 1.1.**

Figure 1.1: Trend of Expenditure on Healthcare and Education in Kenya



Source: Economic surveys

From the trends analysis, it is notable that the Government has over the years invested more on healthcare as compared to education. In addition, there are notable spikes in investments in these two subsectors for the years between 2006 to 2008 and 2012 to 2015 before normalizing in 2016.

1.2 Statement of the Problem

Psacharopoulos and Woodhall (1997) described human capital as a positive reason of productivity to enlarge socio-political and economic development. The Government of Kenya recognizes the significance of human capital in attaining projected growth targets highlighted in the country's development plans. This is attested in the recorded increased annual expenditure levels for education and healthcare as contained in the annual budgetary provisions which are evidently aimed at improving the capacity and wellbeing of human capital for efficiency and effective service delivery.

Vision 2030 on the other hand provides for a plan by the country to intensify the application of science technology and innovation (ST&I) to raise productivity and efficiency which inspire the necessity for a highly skilled and healthy human capital to facilitate development of policies, strategies and programmes that would address the persistent macroeconomic and social-economic challenges, facing the country. Such levels of enhanced skills and healthy workforce natured to realize improved productivity and efficiency, can only be a consequence and result of deliberate investments whose impact on economic growth ought to be demonstrable.

Despite the critical role of investments in human capital, an empirical assessment of how such investments by the Government of Kenya on education and healthcare sectors, impact on the nation's economic growth is lacking. This has led to the present constraints of insufficient budgetary allocations and limited fiscal attention accorded to the two sectors that are essential to enhancing human capital capacities and wellbeing for the attainment of targeted economic growth projections (KIPPRA Policy Brief, 2018). According to the United Nations (2008), high quality labor is critical to enhancing the ability of entities within an economy to achieve rapid and sustainable growth and this provides strong support for sustainable development. Yet information on impact assessment of such correlation with respect to the Kenyan economy is not available.

1.3 Research Questions

i) What is the impact of government investment in education on economic growth in Kenya?

ii) What is the impact of government investment in healthcare on economic growth in Kenya?

iii) What policy recommendations can be drawn from the results of (i) & (ii) above?

1.4 Objectives of the Study

i) To determine the impact of investments in human capital development in education on economic growth in Kenya.

ii) To determine the impact of investments in human capital development in healthcare on economic growth in Kenya.

iii) To draw conclusions and policy recommendations from the results of (i) & (ii) above.

1.5 Justification of the Study

The results of the study will significantly add new knowledge to the understanding of how investments in education and healthcare as the prime dimensions of human capital impacts on economic growth in Kenya. The study intends to draw inferences driven by research based on the analysis of Government investments on these critical attributes of human capital and how such investments influence economic growth statistics for targeted budgeting.

The results of the study will also provide research based information to fiscal analysts and policy makers in understanding the relationship between investments in human capital development programmes and growth of Kenyan economy. In addition, economists, budget officers, and concerned citizens will have reliable information source to inform better budget making process. Moreover, the findings of the study would influence decisions on prioritization in the allocation of resources in Kenya to build the capacities of human capital and thereby, enable Kenya achieve its desired economic growth projections as envisioned under Vision 2030. Finally, the identified areas that would be recommended for further research in the study, would enable scholars with interest on the topic area to pursue further knowledge.

1.6 Organization of the Study

Chapter one highlighted the background information, statement of the problem and objectives of this research. Chapter two outlines literature review of both theoretical and empirical literature and concludes with a brief overview of the literature reviewed. Chapter three highlights the methodology utilized in undertaking the analysis which includes a highlight of conceptual framework adopted by the study, theoretical model and empirical model specification and the estimation procedure used. The chapter concludes by defining the variables and their measurements and describing the data sources. Chapter four highlights the analysis of observed results from the study while Chapter five gives conclusion, policy recommendations and areas identified for further research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, existing literature on the subject matter is reviewed to provide information on the existing knowledge base, with a view to understanding the parameters that are under review more comprehensively. The chapter further highlights some of the notable critique to current literature on the subject and concludes with a brief summary of literature overview to bring out existing literature gap upon which the paper purpose to bridge.

2.2 Theoretical Literature Review

Two theoretical approaches are taken by the study in reviewing literature on how investment in the two human capital dimensions of healthcare and education contribute to general economic growth over time. The two theories are Human Capital Theory and Endogenous growth theory. Human Capital Theory assess the evidence for the worth and significance of human effort to organizational success. The review underscores the critical contribution that social capital plays both at the individual and organizational level to create economic value and stimulate creativity and innovation. Endogenous growth theory on the other hand, is primarily premised on the fact that over the long run, the rate at which an economy grows significantly hinges on policy and strategic steps developed and deployed by human capital.

2.2.1 Human Capital Theory

Becker (1964), posits that human capital is an input into production activity, upon which additional productivity is brought about and realized through additional investment. However, unlike the other production parameters e.g. physical capital and land, the contribution of human capital is substitutable, but not transferable and can be clustered into three categories namely; Social Capital, Intellectual Capital and Emotional Capital (Becker 1964). Mahroum (2007) states that the scarcity problem of physical capital in majority of labour surplus economies ought to be addressed through fast-tracking the pace of developing human capital to improve their quality via targeted investment programmes.

Mahroum further noted that, utilization of human resources at macro-level, is dependent on the following major dimensions: the ability to cultivate talent, the ability to employ talent, and the ability to import talent from outside the given production system. In summary, the contribution of human capital is an element of output in a production framework which gets inspired by the level of

investment it is exposed to. This therefore, implies that the backbone to progress in a production process which culminates into sustainable economic growth, substantially correlates with the level of investment apportioned to human capital advancement.

Cumulative Growth of Human Capital

The distinctive difference between human capital and real monetary capital is based on the extraordinary characteristic of human capital to cumulatively grow over time. This implies that it has a homogeneously increasing ratio of growth as the skills improve form one level of complexity to the next within a given time frame. This study focuses on educational and health inputs as the foundational factors upon which the analysis of human capital is premised and analyzed over a specified time period. These two inputs generate comparatively an increased productive influence upon the future generation of the workforce significantly more than that of the previous generation.

The resultant scenario is that the momentum of human capital formation for future generation successively exceeds that of the existing generation. Cumulative growth of human capital therefore, is inferred when an inferior value of personnel is observed in a preceding generation compared to the succeeding one.

The theory of Human capital has been criticized on a number of fronts. Some critics observe that the theory perceive human resource as medium to wealth creations and better income generation rather than as an essential contributor in a production process. Spence (1973) offered signaling theory as a substitute, while Bourdieu (1986) provides a nuanced alternative that incorporates cultural, social, and economic capital aspects

According to signaling theory, put forward by Spence (1973) and Stiglitz (1975), improvement in skills development does not necessarily amount to enhanced human capital, but somewhat represents an indicative instrument by which employees with superior distinctive talents signals prospective employers of their abilities to gain higher average wages. The dictionary of Sociology (1998), indicate that, the proportion of observable disparity in earnings due to skills learned, is considerably high, and may represent aspects of imperfection in the labour-market. This is based on structure and functioning of the manpower that constitute the labour supply, as opposed to the productivities.

2.2.2 Endogenous Growth Theory

The premise of the theory of endogenous growth is predicated on the thinking that growth of an economy is primarily an outcome of internal as opposed to external factors. According to Howitt (2006), the theory postulates factors such as investment in innovation, knowledge and generally

human capital, as having substantial contribution to economic growth. It therefore, pays more attention to positive externalities as having a causal relationship effect on economic development.

In the late 19th Century, a sections of theorists of economic growth models having been discontented with prominence of exogenous factors in defining long-run growth, optioned for a framework that supplanted the factor with a model that optioned for endogenous variable as the main elements of growth in the model. These theorists include Hirofumi Uzawa (1965), Miguel Sidrauski (1967), and Kenneth Arrow (1962). Sergio Rebelo (1991), Paul Romer (1986), Ortigueira and Santos (1997) and Robert Lucas (1988) did not account for technological change but instead, asserted that growth in the model was as a result of sustained human capital investment that resulted in a spillover effect on the general economy and reduced the diminishing return to accumulation of capital.

Howitt and Aghion (1992), Romer (1987, 1990) and Helpman and Grossman (1991), projected an argument that the theory of endogenous growth is buttressed by models where economic players optimally determine saving and consumption, thereby maximizing resource allocations to R&D that enables opportunity for technological advancement and economic development.

The inherent inability of the theory in explaining the causal parameters surrounding conditional convergence and the hypothesis of diminishing returns to capital forms conspicuous bases upon which endogenous growth theory is criticized. Parente (2000) posits that new growth theory just like the theory of exogenous growth, has failed in explaining income disparities between less developed and developed countries. Krugman (1991), disparaged the theory as being difficult to verify by existing empirical evidence stating that it mostly involved assuming how unmeasurable factors influence other unmeasurable parameters.

Critics presents limitations to the theory in explaining the variations in economic growth rate between the less developed and developed economies. Endogenous growth theory however, provides that growth of an economy is principally based on investment in human capital, innovation, and knowledge. This supports the contribution of human capital as a critical driving force and a significant contributor to economic and development. The results of the study can be inferred to support the theory or affirm the basis of its critics and would therefore, enrich the existing literature with updated observations and recommendations as shall be deduced.

2.3 Empirical Literature Review

Most economies that set their strategy focused on growth realize the need for enhanced contribution of knowledge, skills and healthcare of the workforce, commonly known as human capital. It is imprudent therefore, to assume that these objectives could be attained without a good education and healthcare system. A large array of studies have been undertaken both locally and globally to explore this fact. The review of these empirical data is presented hereunder.

Bakare (2006), used vector autoregressive error correction model to investigate implications of human capital growth on Nigeria's annual economic performance. The findings showed existence of a considerable functional and institutional link between the investment in human capital and the expansion of the economy in Nigeria. The research observed that a one percent variance in the level of human capital investment, resulted in forty eight percentage change in growth rate of GDP between 1970 and 2000. In addition, Kwabena (2010), using cross-sectional data on the level of educational achievement studied the impacts of education on development outcomes of a number of African economies and concluded that, conditional on other factors, the level of investment in education has significant positive effect on several aspects of national development i.e. increased incomes, health outcomes, political stability and women participation in national politics.

Jargenson and Frumeni (1992), using growth accounting methodology demonstrated that investing in both physical and human capital accounted for significant percentage growth in both industrial and education sub-sectors of the United States of America's economy. Growth in labor inputs, he found, accounted for in excess of 0.6% of total economic growth, while improvements in labor quality also explained 42% of this labor contribution.

Pradhan and Mallick et al (2016) sought to determine the impact that expenditure on education has on economic growth in sampled countries in Asia as evidenced from econometric analysis, considering the classical theory of production function for a time period spanning from the year 1973 to 2012. The study, using panel integration tests, found out that there is recorded presence of a correlation between expenditure on education and growth of the economy in the long-run. The study therefore, concluded that in long-term, increased expenditure in education sector in each of the countries constitutes an indispensable element of economic growth.

Heshmati (2001) discussed existence of a relation between expenditure in healthcare programmes and GDP in a research that used Solow growth model, and discovered the existence of a correlation between the two variables with acceptable level of significance, where the inclusion of health expenditures resulted in a significant relation between expenditure in human capital and economic

growth. In addition, Adeel (2016) in a study of the expenditure in healthcare services and its impact on productivity of labor in Pakistan using auto-regressive distributive lagged model (ARDL) found that additional expenditure on healthcare, and with an increasing employment rate, the more the workers will be healthy and productive, and the more will be the production which will eventually increase GDP per Capita.

Boussalem et al (2014) when investigating the relation between healthcare spending in Algeria and growth of the economy using co-integration and causality tests and annual data for the period between 1974 and 2014, found that healthcare spending had a substantial influence growth of Algerian economy. Besides, Majdi (2012) studied the correlation between healthcare spending and growth of economies using a sample of 15 countries north and south of Mediterranean, using panel data from 1990 to 2008 and using OLS multiple regression econometric model. The research revealed an existence of positive effect that expenditure on health has on growth of the economy in those sampled economies and in addition, the elasticity of the GDP growth with regard to health care costs was actually greater than 0.8.

In Kenya, Mudaki and Masaviru (2012), explored the impacts of different modules of expenditure by the government on growth of Kenyan economy using Johansens (1988) cointegration, Granger causality tests, regression analysis and Vector Auto regression model method. The paper looked at the connection between educational expenditure among many other variables and growth of the economy and concluded that increased spending on education exhibited the characteristics of a momentous booster of economic growth statistics. The paper therefore recommended increased investment expenditure on education sector as among the key pillar/determinant of Kenya's economic growth.

2.4 Literature Overview

From theoretical literature, it is evident that new growth theories provide much more useful yardstick for discerning the role that human capital plays on economic growth. Investments in education and healthcare are seen as contributing to expansion of the economy by increasing workers productivity, knowledge creation and innovation.

On education front, there is a considerable division in empirical literature as to whether or not investment in education leads to economic growth. Most empirical work on this area are cross country regressions which groups both developing and developed economies together resulting in a considerable overlap in the data sets and specifications utilized by the various studies which could explain the mixed results in empirical work. The empirical literature also shows a myriad of methodological shortcomings in the estimation of the impacts of investment of education variables on economic growth which include problems of measurement of investment in human capital, limited data availability hence the prevalence of cross country regressions, endogeneity bias and parameter heterogeneity resulting from cross country regressions.

On healthcare variable, the reviewed theoretical literature and evidence from empirical data across different countries, and different time frames, show findings that are either conflicting, or contradictory. Even in cases where some papers were analyzing a specific country within similar time frames, the results were somewhat contradictory on the effects that expenditure on healthcare sector exhibit on economic growth. Additionally, Tsaurai (2014) in investigating the relationship between the two variables in Botswana from 1995 to 2012 and checking its relevance with Wagner's theory, using unrestricted co-integration tests, found out a lower significance level of correlation between expenditure on health and economic growth in Botswana, thereby, mismatching Wagnerian theory.

Most of papers reviewed mentioned the gap previous literature including insufficient empirical evidence. Other papers on the other hand used the same quantitative methodology and applied econometric models, notwithstanding the fact of implementing different tests. There was therefore, no obvious common base for ascertaining the link between these two set of variables, which this paper aims to provide. The study will deploy the Vector Auto-Regression (VAR) model which is relatively flexible in analysis of dynamic behavior of economic multivariate time series data.

CHAPTER 3

RESEARCH METHODOLOGY

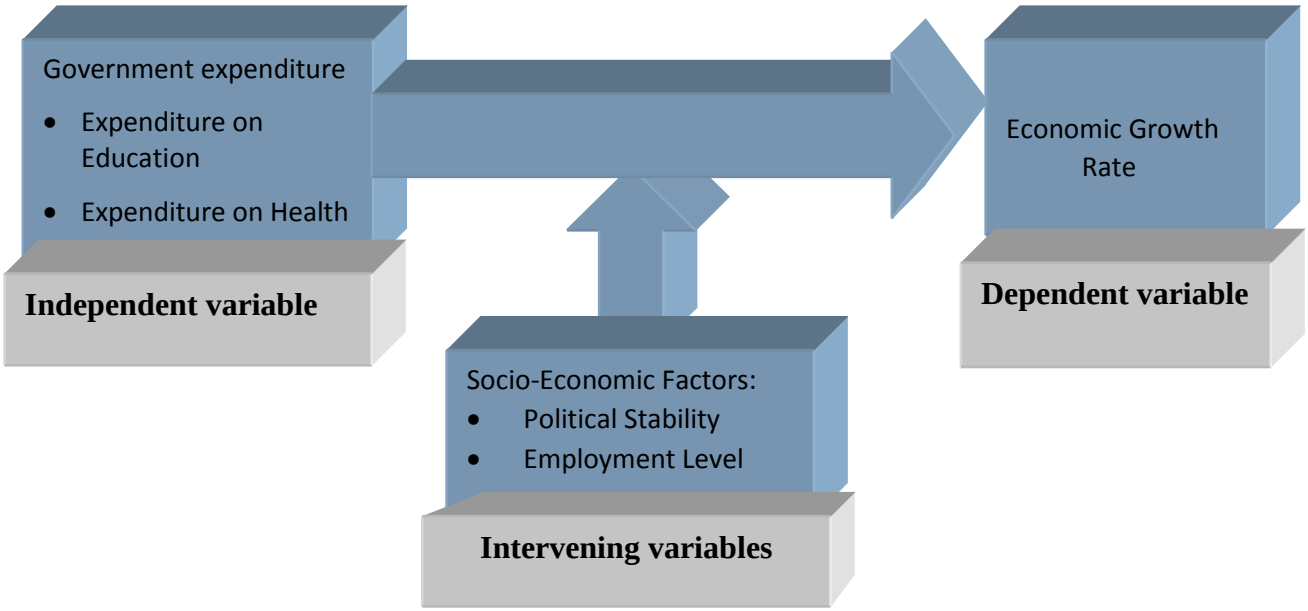
3.1 Introduction

The chapter brings forth the conceptual framework followed by the methodology employed in examining the impact of public sector investment in human capital on economic growth. It further, highlights theoretical model and specification of the model for data analysis and outlines the description of variables and the estimation techniques to be used in the empirical analysis. Finally, the chapter concludes by describing diagnostic tests and a highlight of data sources.

3.2 Conceptual Framework

The study adopts the framework shown in **Figure 3.1** below. The conceptual framework illustrates how government expenditure in human capital is connected with and influence economic growth in Kenya. The framework considers socio-economic factors as intervening variables:

Figure 3.1: Conceptual Framework



In this conceptual framework, expenditure programmes and policies of the Government of Kenya, such as expenditure on education and healthcare forms the independent variable. The impact of such investments in the development human capital on economic growth is also influenced by other socio-economic factors such as political stability and natural occurrences which forms the intervening variable. Growth in the economy brought about by improved expenditure on education and healthcare forms the dependent variable.

3.3 Theoretical Model

The study will utilize a multiple regression model premised on the theoretical framework advanced by Weil, Mankiw and Romer (1992) who studied the Empirics of Economic Growth to examine consistency of Solow growth model with variations in international standard of living. Weil et al used savings, education and population growth to explain the existence of cross country differences in income per capita.

Solow's model is represented as:

$$Y = AL^{\propto}K^{1-\propto} \quad \text{.....3.1}$$

Where Y is GDP, A is technological progress, L is labour and K is capital. Capital consists of human capital and government expenditure. Thus, K can be disaggregated into K_h which is human capital and K_g development capital by the government. This model was adopted to reflect the existence of a relationship between the study variables. The study used government expenditure on healthcare (K_h) and education (K_e) to measure human capital while development expenditure was used to measure public investment (K_g).

Equation 3.1 can therefore be rewritten as:

$$Y = A\,L^{\propto}Kh^{\beta}Ke^{\infty}\mathrm{Kg}^{\theta} \quad \text{.....3.2}$$

Where: ɵ, ∝,∞,β measures elasticity and ɵ+ ∝+∞+β =1

To estimate the impact of government investment in healthcare and education as dimensions of human capital on economic growth, equation 3.2 was linearized as follows:

$$Ln\,Y = Ln\,A + \propto LnL + \beta\mathrm{LnKh} + \infty\mathrm{LnKe} + \theta Lnkg \quad \text{.....3.3}$$

Equation 3.3 implies that variation in economic growth is explained by variables on the right hand side of the model.

3.4 Model Specification

To achieve the study objectives, the paper adopted Vector Auto-Regression (VAR) model based on the fact that it is simple to use and flexible in analyzing multivariate time series data which are dynamic by nature. The model provide better forecasts of data analyzed which can be qualified on possible projections of the behavior of specified variables in the model. initial use of VAR in

economics was undertaken by Sims (1980) on critique of the "incredible restrictions" used by the large macro econometric models developed in the 1970s.

The standard VAR multiple regression model is generally specified as follows:

$$Y_t = \beta_0 + b_1 Y_{t-1} + b_2 Y_{t-2} + \ldots + b_p Y_{t-p} + \varepsilon_t \quad \ldots\ldots 3.4$$

Where:

Y_t - is an (n x 1) column vector for endogenous variables

β_0 - is an (n x 1) column vector of constant intercepts

b_p - is an (n x n) matrix of coefficients

p - is a lag length

ε_t - is an (nx1) column vector of serially uncorrelated forecast errors with zero means and constant variances.

The VAR model adopted by this study does not utilize any economic structure beyond the choice of variables highlighted herein. It considers all the variables to be endogenous in order to avoid the randomized separation of variables as exogenous and others as endogenous, as is the case in structural models.

In VAR model estimation, each variable is lagged p times against itself, against other variables and against the error term. Longer lags are usually preferred as they comprehensively capture the dynamics of the economic situation being modeled and increase the number of parameters. In this study, Akaike Information Criterion (AIC) among other Criteria would be utilized to determine number of lags.

In the analysis of a bivariate function $Y_t = (y_t, z_t)$, first-order VAR model:

$$Y_t = b_{10} - b_{12}\, z_t + \gamma_{11} y_{t-1} + \gamma_{12} z_{t-1} + \varepsilon_{yt} \quad \ldots\ldots 3.5$$

$$Z_t = b_{20} - b_{21}\, y_t + \gamma_{21} y_{t-1} + \gamma_{22} z_{t-1} + \varepsilon_{zt} \quad \ldots\ldots 3.6$$

Whereas the structural VAR is not directly estimable, the reduced form is estimable by writing the structural VAR in matrix form as follows:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} y_{11} & y_{12} \\ y_{21} & y_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad \ldots\ldots 3.7$$

In short;

$$BY_t = \Gamma_0 + \Gamma_1 Y_{t-1} + \varepsilon_t \quad \ldots\ldots 3.8$$

Pre-multiplication by B^{-1} allow us to obtain a standard VAR in (3) above:

$$Y_t = B^{-1}\Gamma_0 + B^{-1}\Gamma_1 Y_{t-1} + B^{-1}\varepsilon_t \quad \ldots\ldots 3.9$$

Or simply;

$$Y_t = A_0 + A_1 Y_{t-1} + a_t \quad \ldots\ldots 3.10$$

This reduced form is estimated using OLS equation by first determining the optimal lag length of the VAR and stability conditions. Estimation process involves regressing each variable on a constant A, p lags of each of the other variables in the model and p lags of itself and also the disturbance term $\boldsymbol{\varepsilon_{yt}}$. The root of the matrix A_1 must be all less than 1 in absolute value for the system to be stable.

The study will derive Impulse Response Functions (IRF) from VAR coefficients to analyze the impact of government investment on healthcare and education on economic growth in Kenya. This is because VAR coefficients belong to reduced form and thus has less meaning.

The study will utilize Johansen 1988 test to test for long run relationship between the study variables. Johansen cointegration test was preferred due to its ability to test for multiple cointegration equations among the study variables. Presence of co-integration would therefore, infer the presence of a long run correlation between the series. The tests would be undertaken by Reduced Rank Regression by Johansen (1996).

3.5 Definition of Variables

This study is expected to verify the manifestation of a link and influence that government investment in education and healthcare has on economic growth as specified in the model. The definition of the variables, Measurement and Expected Signs of Variables are shown in **Table 3.1.**

Table 3.1: Measurement of Variables and Expected Signs

Variables	Definition of Variables	Measurement	Expected Sign and Source
Gross Domestic Product (Economic Growth)	GDP is the dependent variable of the model.	This is a numerical variable and is measured as a percentage growth in GDP in Kenya shillings per year.	
Government Investment in Education	K_e is an independent variable.	Measured by expenditure by the government on education in Kenya shillings per year	This variable is expected to infer a positive (+) influence on economic growth (Mallick, Das and Pradhan, 2016)
Government Investment in Healthcare	K_h is a independent variable.	Measured by government expenditure on healthcare in Kenya shillings per year	This variable is expected to display a positive (+) influence on economic growth, Bedir (2016).
Public Investment	K_g is a control variable.	Measured by government expenditure on development capital in Kenya shillings per year	This variable is expected to show + influence on economic growth Oguso (2017).
Labour	L is a control variable	Measured by annual number of total employments.	This variable is expected to show + influence on economic growth. Sodipe, et al. (2011).

Source: Author

3.6 Diagnostic Tests

The study will conduct diagnostic checks on both the general model and error correction model using residual and stability tests in order to ensure validly and reliability of the outcomes. Residual tests check the behavior of the error term and in the study histogram-normality and Breusch-Pagan-Godfrey Test would be undertaken to test for heteroscedasticity of errors in the regression.

3.6.1 Unit Root Test

In the estimation of VAR equation, characteristics of data are to be examined by undertaking stationarity test on the time series data. The test is critical in averting the assumption that time series data are stationary. Generally, statistical tests have limited prospect in making appropriate inferences which may then be ambiguous. The study tests for integration by using the Augmented Dickey Fuller test.

3.7 Data type and Source

Time series Secondary data for Kenya for the period between the year 1985 and 2018 are to be analyzed to investigate the existence of a relationship in the variables. Data will be collected from the Kenya's economic surveys published by KNBS annually, the relevant World Bank database, other Government and previous research based publications and any other reputable source whose data would be relevant to the study.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

Empirical findings are presented in this chapter of the paper which include: descriptive statistics, time series properties and objectives results.

4.2 Descriptive Statistics

These enable an appreciation of the characteristics of variables under study. Notable descriptive statistics of the data for analysis under this study are as presented in **Table 4.1.**

Table 4.1: Descriptive Statistics (Nominal Values)

	Public Investment	Education Investment	Labour	GDP	Health Investment
Mean	1.40E+08	7,151,473	1940.38	2,077,873	25,249,093
Median	45,320,998	1,813,000	1,835	952,500	13,620,550
Maximum	5.59E+08	22,071,650	2,835	8,905,000	1.52E+08
Minimum	3,947,700	334,000	1,174	99,860	1,511,800
Std. Dev.	1.79E+08	7,887,913	507.621	2,485,487	36,545,392
Skewness	1.399062	0.854287	0.36494	1.439944	2.590983
Kurtosis	3.62226	2.052455	1.92264	3.923735	9.2185
Jarque-Bera	11.64034	5.407506	2.399	12.95832	92.82356
Probability	0.0030	0.0670	0.3013	0.0015	0.0000
Sum	4.76E+09	2.43E+08	65973	70,647,693	8.58E+08
Sum Sq. Dev.	1.06E+18	2.05E+15	8,503,392	2.04E+14	4.41E+16
Observations	34	34	34	34	34

Source: Author's Calculation, 2019

Table 4.1 indicates that public investment variable, investment in education, GDP and health investment variable were not normally distributed at 10 percent level signification. Which indicates presence of outliers. This is because their Jarque Bera p-value was less than 0.1 critical p-value at 10 percent level signification. To solve this, all these variables were linearized to ensure that the variables are normally distributed and to eliminate outliers. The results are as shown in **Table 4.2.**

Table 4.2: Descriptive Statistics (after Linearization)

	Public investment	Education investment	Labour	GDP	Health Investment
Mean	17.82824	15.0096	7.53749	13.78323	16.29923
Median	17.62828	14.41047	7.514721	13.76418	16.42705
Maximum	20.14181	16.9098	7.949797	16.00212	18.84229
Minimum	15.18864	12.7189	7.068172	11.51152	14.22881
Std. Dev.	1.49292	1.349371	0.261778	1.342734	1.254441
Skewness	0.045843	0.122746	0.033421	-0.00914	0.138711
Kurtosis	1.859758	1.579536	1.917853	1.900529	2.303483
Jarque-Bera	1.85379	2.943812	1.665305	1.712993	0.796307
Probability	0.395781	0.229488	0.434894	0.424647	0.671559
Sum	606.1603	510.3262	256.2747	468.6297	554.1739
Sum Sq. Dev.	73.55069	60.08645	2.261411	59.4968	51.92949
Observations	34	34	34	34	34

Source: Author's Calculation, 2019

The results in **Table 4.2** indicates that the all the variables are normally distributed and can therefore, be used for analysis. Empirical test and analysis are therefore, henceforth undertaken based on linearized variables.

4.3 Time Series Properties

Time series properties were determined to avoid spurious results, where one or more other variables exogenous to the model are associated but not causally related to the variables under consideration due to either coincidence or the presence of an unseen factor, otherwise known as confounding factor. The properties include; stationarity and cointegration.

4.3.1 Stationarity Test Results

The study utilized Augmented Dickey–Fuller (ADF) tests to test for stationary of the series variables. The unit root test for stationarity is important in determination of whether trending data should be differenced or be directly regressed on deterministic functions of time to render the data stationary. This is to manage the unpredictability of results in time series analysis caused by unit roots. The results are as shown in **Table 4.3.**

Table 4.3: Stationarity Test Results

Variable	Type	p-value (Level)	P-value (1st difference)	Conclusion
Health Investment	Intercept	0.6815	0.0010	I(1)
	Trend &Intercept	0.1939	0.0060	
GDP	Intercept	0.8948	0.0001	I(1)
	Trend &Intercept	0.5914	0.0007	
Employment	Intercept	0.3532	0.0069	I(1)
	Trend &Intercept	0.4024	0.0008	
Education Investment	Intercept	0.5245	0.0419	I(1)
	Trend &Intercept	0.5004	0.0054	

Source: Author's Calculation, 2019

Stationarity test outcomes shown in **Table 4.3** confirms that study variables are stationary after the first difference and hence I(1). This signifies the probability of long run relationship between the study variables and therefore, presents the need to undertake a cointegration test to verify the same.

4.3.2 Cointegration Test Results

The study utilized Johansen cointegration test to asses for long run relationship between the study variables. Johansen test was preferred due to its ability to test for multiple cointegration equations among the study variables. Cointegration results are as shown in **Table 4.4.**

Table 4.4: Cointegration Test Results

Sample (adjusted): 1987 2018				
Included observations: 32 after adjustments				
Trend assumption: Linear deterministic trend (restricted)				
Series: LNGDP_ LNHEALTHINV_ LNPUBINV _LNEMPLO _LN_EDU_INVES				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test **(Trace)**				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.723511	114.4394	88.8038	0.0002
At most 1 *	0.70535	73.30078	63.8761	0.0065
At most 2	0.365295	34.19782	42.91525	0.2795
At most 3	0.314696	19.65077	25.87211	0.2441
At most 4	0.210373	7.55821	12.51798	0.2899
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test **(Maximum Eigenvalue)**				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.723511	41.13867	38.33101	0.0232
At most 1 *	0.70535	39.10296	32.11832	0.006
At most 2	0.365295	14.54704	25.82321	0.6748
At most 3	0.314696	12.09257	19.38704	0.4066
At most 4	0.210373	7.55821	12.51798	0.2899
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Author's Calculation, 2019

Both Max Eigen value and Trace tests indicates the existence of 2 cointegrating equations which confirms the prescience of a long-run correlation between economic growth and the independent variables.

4.3.3 Determination of Lag Length

The study utilized Akaike information criterion (AIC) among other Criteria in determining the lag length. AIC is a more appropriate criterion when observations are less than 60. The results are shown in **Table 4.5.**

Table 4.5: Lag Length Determination

VAR Lag Order Selection Criteria						
Endogenous variables: LNGDP _LNHEALTH_INV LNPUBINV _LNEMPLO LNEDUINVES						
Exogenous variables: C						
Included observations: 32						
Sample: 1985 to 2018						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	17.00245	NA	3.25e-07	0.750153	0.521132	0.674239
1	172.5182	252.7131	9.53E-11	-8.907389	-7.533261*	-8.4519
2	199.3769	35.25206*	9.60e-11*	-9.023558*	-6.504324	-8.1885*
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Source: Author's Calculation, 2019

Based on the lag order selection criteria results highlighted above, AIC indicates that the feasible lag length to be used in the analysis was two. Moreover, majority of the lag criteria shown in the table indicates that two to be the selected lag order.

4.4 Impact of Education and Healthcare Investment on Economic Growth in Kenya

The paper employed Restricted VAR to achieve the study objectives due to long run relationship that existed between economic growth and independent variables. Estimates from restricted VAR were used to derive impulse response functions which were utilized in interpreting the impacts of investment in human capital (education and healthcare) on economic growth. Before impulse dynamics were used for interpretation, diagnostic tests were conducted to confirm that VECM was statistically appropriate. They also ensure that the results were reliable and not spurious.

Figure A1 of **Appendix I**, shows that all roots of polynomial are within the unit cycle which implies that the model is stable. The results also show that the residuals are normally distributed. This is because the p-value for joint Jarque- Bera statistics of 0.0950 was greater than critical p-values at 5 percent level of significance. Therefore, the null hypothesis of normally distributed residuals was not rejected. **Table 4.6** also shows no problem of heteroscedasticity and serial

correlation. This is because the p-values of 0.1442 and 0.8232 for heteroscedasticity and serial correlation tests are greater than critical p-values at 5 percent level of significance. The model was therefore concluded to be stable and statistically appropriate for the estimation of impacts of fiscal dominance on economic growth in Kenya.

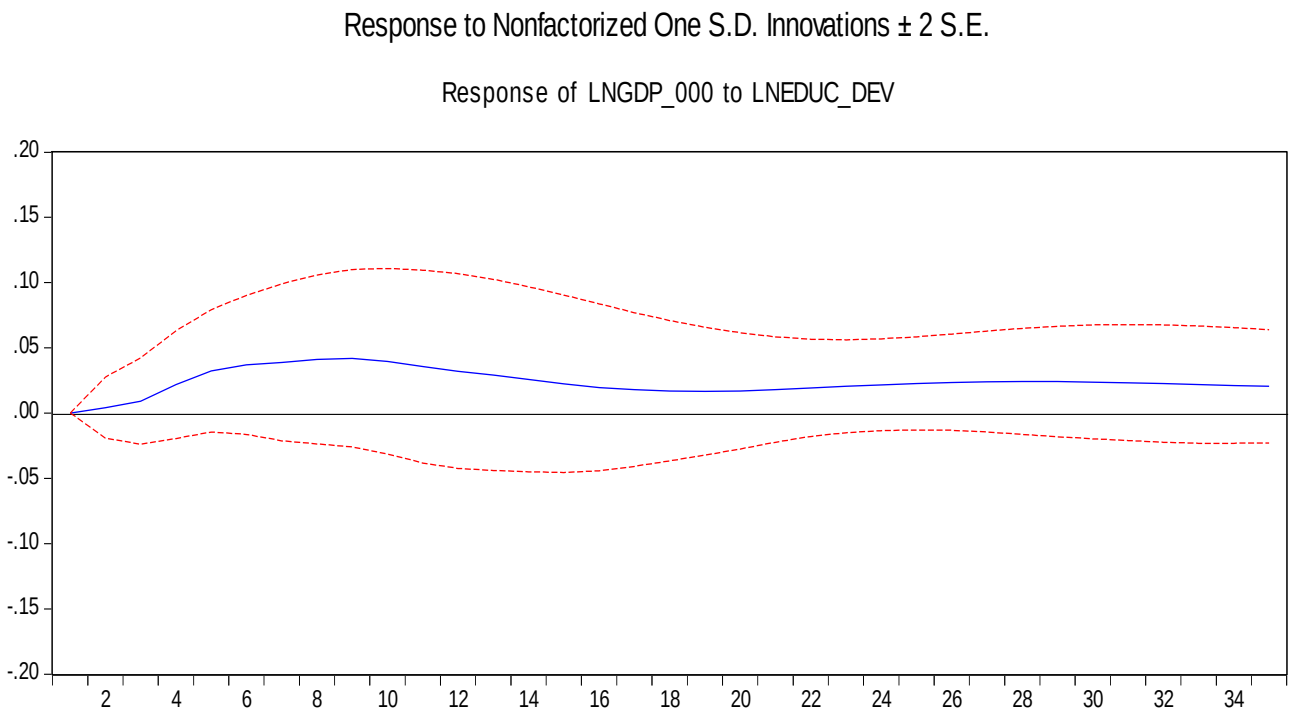
Table 4.6: VAR Diagnostic Test Results

VAR Condition Check	Statistics	Conclusions
Stability Condition	Roots of polynomial are within unit root (shown by figure A1of appendix 1)	VAR is stable
Residual Serial Correlation	LM statistics= 42.7140 P-value = 0.8232	No serial correlation
Residual Multivariate Normality Test	Jarque-Bera Stat (Joint)=47.6247 P-value=0.0950	Residuals are normally distributed
Residual Heteroscedasticity	Chi-square= 326.264 p-value= 0.14 42	No heteroscedasticity

Source: Author's Calculation, 2019

The impact of investments in human capital development in education and healthcare on economic growth in Kenya is as shown in **Figure 4.1** and **Figure 4.2** respectively.

Figure 4.1: Impulse Response Functions of Economic Growth to Education Investment

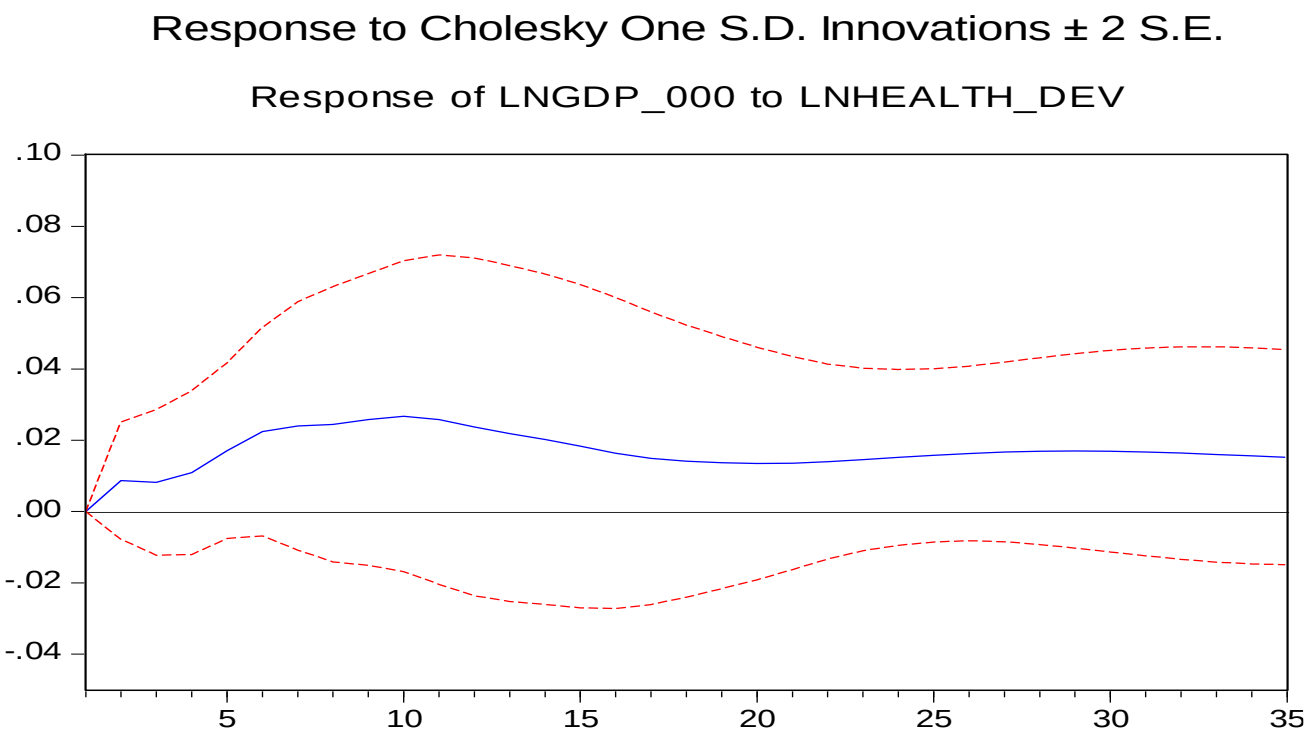


Source: Constructed from study data, 2019

From **Figure 4.1**, it is clear that the response of economic growth due to changes in education investments lasts for long period (more than 35 years) before wearing out. Also, it was established that one standard deviation shock to investment in education had a positive impact on economic growth. The impact of investment in education is felt after the first year. The positive impact increases smoothly after the second year all the way to the eighth year when the impact starts decreasing. The impacts remain at the positive territory though lower in magnitude suggesting that investment in education has a positive impact on economic growth. Thus, investment in education has a positive impact on economic growth both in the short-run and long-run. These results support those Pradhan and Mallick et al (2016) a study in Asia.

Similarly, the response of economic growth due to changes in healthcare investments lasts for long period (more than 35 years) before wearing out. This is as shown in **Figure 4.2**.

Figure 4.2: Impulse Response Functions of Economic Growth to Healthcare Investment



Source: Constructed from study data, 2019

It is also clear that, a one standard deviation shock to healthcare investment had a positive on economic growth. The impact of healthcare in investment is felt immediately in the economy. The positive impact increases gradually after the first year and reaches its peak in the tenth year when the impact starts decreasing. The impacts remain at the positive territory though lower in magnitude

suggesting that healthcare investment has a positive impact on economic growth even in the long-run. Thus, healthcare investment has a positive impact on economic growth both in the short-run and in the long-run. These findings supports those of Adeel (2016) and Boussalem *et al*(2014) in Pakistan and Algeria respectively. Moreover, the results are in line with Becker's human capital theory that explains that human capital has a positive impact on economic growth.

These results are also in consonance with Endogenous Growth Theory and aligns with inferences by Howitt (2006), who postulated that factors such as investment in innovation, knowledge and generally human capital, have a substantial contribution to growth of the economy.

The cumulative growth of human capital reviewed in Chapter 2 offered a scenario where the momentum of human capital formation for future generation successively exceeds that of the existing generation, thereby inferring that an inferior value of personnel is observed in a preceding generation compared to the succeeding one. The results of the study aligns to this perspective since from the findings, a positive impact of education in investment is felt after the first year and increases smoothly after the second year all through to the eighth year when the impact starts decreasing. Nevertheless, he impacts remain at the positive territory though lower in magnitude suggesting that education investment has a positive impact on economic growth both in the short-run and long-run

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

The summary, conclusions and policy recommendations arising from the research findings are presented in this chapter. In addition, the inferred information that would contribute to bridging the knowledge gap and identified areas of further research are highlighted based on study findings.

5.2 Summary

Government of Kenya allocates financial resources on an annual basis on expenditure programmes and investments targeted towards education and healthcare improvements for its labour force. The consistent growth of government expenditure on human capital in Kenya has caused knowledge gap among policy level decision makers on the impact of such investments on the general economic growth. In light of this fiscal scenario, an explanation of this lacuna requires research driven impact analysis. The objectives of the study were to: to determine the impact of investments in human capital development in education on economic growth in Kenya; to determine the impact of investments in human capital development in healthcare on economic growth in Kenya; and to draw conclusions and policy recommendations from the results realized.

Specifically, the study sought to determine the impacts of human capital investment in healthcare and education on economic growth in Kenya. The paper utilized quantitative annual time series data 2018 to achieve the study objectives obtained from World Bank Database and Economic Surveys.

The study was anchored on Solow's Swan growth model since it links investment in human capital to economic growth through the capital component. Before data were analyzed, time series properties were determined to safeguard that the results from spurious characteristics. ADF test was undertaken to test for presence of unit root and the test found that all study variables were stationary after the first difference and hence I(1). Johansen (1988) was also used to test for long run relationship between the study variables since they were all I (1). Both max eigen and trace confirmed that the variables were cointegrated and therefore restricted VAR was estimated. Before the results obtained from VAR were interpreted, residuals and estimates were subjected to diagnostic test. This was to ensure that the models used were statistically appropriate and that the estimates from these models were efficient, consistent and reliable.

The study utilized impulse dynamics test derived from restricted VAR to achieve the first and the second objective. Estimates obtained from restricted VAR were used to derive impulse response

function and variance decomposition analysis which were utilized to interpret the impacts of investment in human capital development on healthcare and education on growth of Kenyan economy. The study found that one standard deviation shock to education investment had a positive impact on economic growth. In addition, the impact was felt after one year and it lasted for more than 35 years before wearing out. Similarly, the study established that investment in healthcare had a positive impact which is felt immediately and increases gradually with time.

5.3 Conclusions

The impact of investment in education on growth of Kenya's economy is positive in the short-run and in the long-run. This is attributable to the fact that education benefits are lagged, that is, they take time before they are felt in the economy. For example, educated person takes few years before they are employed and start working. Nevertheless, the magnitude of the impact on economic growth reduces with time. This infers that, in the short-run, the magnitude of education investment is high than in the long-run. Thus, the findings of the study are in consonance with human capital theory.

The impact of healthcare investment on the other hand, was felt immediately in the economy increased progressively with time. The study found that, the impact of healthcare investment on economic growth is positive in the short-run and long-run. Nevertheless, the magnitude of the impact on economic growth reduces with time. This infers that, in the short-run, the magnitude of healthcare investment is high than in the long-run. Thus, the findings of the study are in consonance with Solow's theory of economic growth through capital.

Therefore, the study concludes that, investment in human capital especially in education and healthcare are key stimuli to economic growth in Kenya through productivity and value add.

5.4 Policy Recommendations

The following recommendations based on the elements of expenditure on healthcare and education and the impact of such expenditures on economic growth are given to motivate prioritization in the allocation of resources in Kenya. The aim is to build the capacities of human capital and thereby, enable Kenya achieve its desired economic growth projections as envisioned under Vision 2030. First, the study found that one standard deviation shock to education investment had a positive impact on economic growth, and that the impact was felt after one year and lasted for more than 35 years before wearing out. Secondly, the study established that healthcare investment had a positive impact which is felt immediately and increases gradually with time. The study therefore, recommends that the government through its relevant policy making and budgeting institutions

design policies aimed at attracting and improving public and private investments in human capital. This will spur economic growth and help achieve the development goals espoused under Vision 2030. Policies should be initiated to channel resources to these critical sectors that acts as enablers to growth and positively influence economic development of the economy over the long term. Finally, it is recommended that the allocation of funds by the Government to the human capital sector should be sustained overtime as the impact on economic growth is felt both in the short-term and the long term.

Recommendations for Further Research

The study recommends a study on other factors that impact on economic growth apart from the expenditure on human capital since this would provide the necessary information on a more comprehensive approach to budgeting and investment policies in Kenya.

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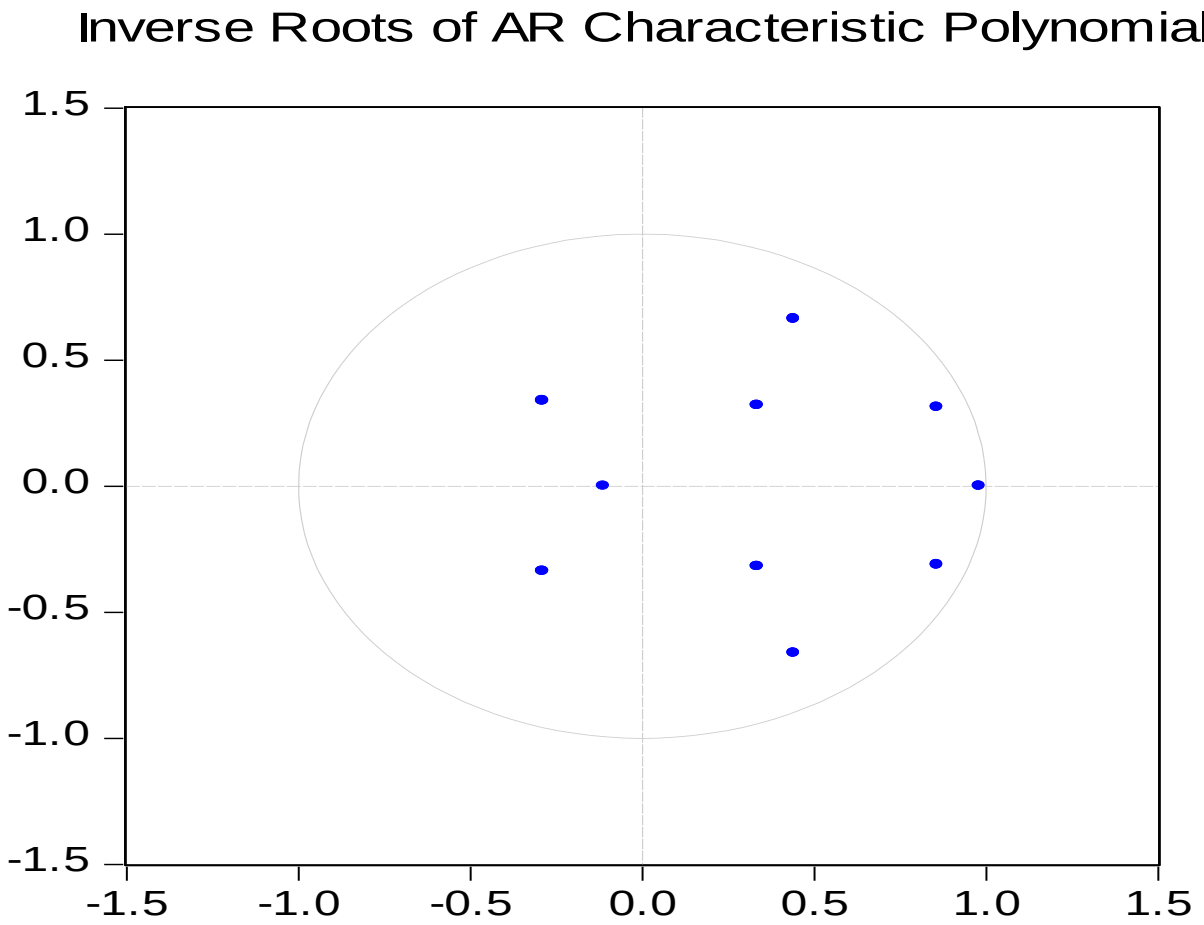
APPENDIX I

Figure A_1 VAR Stability Test Results



APPENDIX II

DATA SET

Year	GDP' Million	Employment '000	Public Investment (000)	Education Investment'000	Healthcare Investment'000
1,985	99,860	1,174	3,947,700	334,000	1,511,800
1,986	116,860	1,230	5,015,800	495,000	1,747,600
1,987	131,220	1,280	6,358,000	562,100	1,999,700
1,988	151,020	1,341	7,918,800	817,500	2,214,400
1,989	172,340	1,373	10,264,200	979,400	2,365,900
1,990	200,000	1,408	11,006,200	1,088,300	2,525,100
1,991	220,000	1,442	10,326,600	1,260,500	2,858,300
1,992	260,000	1,462	89,918,300	1,300,700	3,277,400
1,993	320,000	1,475	95,745,800	1,317,700	4,024,100
1,994	400,000	2,773	23,962,900	1,483,300	5,223,900
1,995	460,000	2,675	27,358,200	1,825,100	6,671,500
1,996	520,000	2,691	28,966,500	1,781,700	7,692,500
1,997	620,000	2,835	21,087,920	1,732,800	8,520,900
1,998	694,000	1,678	17,686,120	1,800,900	9,145,400
1,999	753,500	1,688	22,155,365	1,252,100	9,192,600
2,000	796,300	1,695	28,305,555	736,950	12,029,450
2,001	883,000	1,677	29,818,900	606,250	13,736,750
2,002	1,022,000	1,700	28,118,370	1,629,900	13,504,350
2,003	1,136,000	1,723	43,292,540	3,483,744	15,379,168
2,004	1,283,000	1,764	47,349,455	4,735,277	17,100,269
2,005	1,416,000	1,812	51,261,440	6,071,728	18,663,461
2,006	1,623,000	1,858	84,489,515	7,785,370	20,369,550
2,007	1,833,511	1,910	134,746,665	7,097,045	22,245,885
2,008	2,107,589	1,944	166,515,045	8,765,865	69,146,815
2,009	2,366,984	1,959	177,831,470	14,595,445	71,768,435
2,010	2,570,000	2,016	214,843,840	17,538,750	29,667,165
2,011	3,725,918	2,084	253,067,190	20,554,565	34,514,090
2,012	4,261,151	2,156	281,090,005	20,577,815	43,814,140
2,013	4,745,439	2,283	405,637,195	19,375,900	35,517,000
2,014	5,403,000	2,370	541,767,365	21,589,560	152,000,000
2,015	6,284,000	2,478	527,765,395	18,527,315	151,000,000
2,016	7,023,000	2,554	554,423,175	18,828,265	24,655,595
2,017	8,144,000	2,700	559,083,620	22,071,650	29,221,070
2,018	8,905,000	2,765	246,193,555	10,547,590	14,317,625