AN EXAMINATION OF THE IMPACT OF EDUCATION ON ECONOMIC GROWTH IN NAMIBIA

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PEZO PAULINE ENDYALA

STUDENT NUMBER: 200939424

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SUPERVISOR: DR. O. KAKUJAHA-MATUNDU (UNAM)

Abstract

This study examines the relationship between education and economic growth for the Namibian economy by employing Real Gross Domestic Product (RGDP), gross fixed capital formation (GFCF) and education index (EDU) for the period 1980 to 2017. This study uses Real Gross Domestic Product as a proxy for economic growth. The series were tested for stationarity using Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. The Autoregressive Distributed Lag approach to co-integration is employed to carry out the study. The study also uses the Granger Causality test. In particular the research main objective is to investigate the relationship between education and economic growth.

The findings indicate that RGDP and GFCF variables were stationary in levels while EDU was found to be non-stationary however became stationary after being differenced once. Granger Causality test results do not support the hypothesis of education causing economic growth in Namibia and concurs with the results of ARDL test to co-integration. The empirical investigations suggest that education has no significant impact on economic growth in Namibia.

The results have implications for both policy and further research, which are outlined in the final chapter.

DECLARATION

I, Pezo Pauline Endyala, hereby declare that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher learning.

……Date……

Pezo Pauline Endyala

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List of Abbreviations

ADF	Augmented Dicky-Fuller
ALR	Adult Literacy Rate
ARDL	Autoregressive Distributed Lag
ARMA	Autoregressive Moving Average
DOLS	Dynamic Ordinary Least Squares
ECD	Early Childhood Development
ECM	Error Correction Model
EDU	Education
ETSIP	Education and Training Sector Improvement Programme
GDP	Gross Domestic Product
GER	Gross Enrollment Ratio
GFCF	Gross Fixed Capital Formation
GMM	Generalised Methods of Moments
IGCSE	International General Certificate of Secondary Education
IMF	International Monetary Fund
MTEF	Medium-term Expenditure Framework
NDP	National Development Plan
NIED	National Institute for Educational Development
NPC	National Planning Commission
NSA	Namibia Statistics Agency
PP	Phllips-Perron
RGDP	Real Gross Domestic Product
SWAPO	South West African People's Organisation
UNIN	United Nations Institute for Namibia
VAR	Vector Auto Regressive
VECM	Vector Error Correction Model

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Dedications

This paper is dedicated to my husband and children who have been the source of my strength. Thank you for being my inspiration and for walking this journey with me; To my parents and siblings who have contributed to the person that I am today.

CHAPTER ONE: INTRODUCTION

1.1 Orientation to the proposed study

Education plays a vital role in enhancing economic growth by increasing productivity. It is one of the significant components of human capital formation. Education plays a key role in creating employment opportunities and alleviates poverty (Aghion, Bouston, Hoxby, and Vandenbussche, 2009).

Education in Namibia has undergone various changes introduced to the curriculum, notably the learner based approach in order to improve the quality of education. This has been for the purpose of growing a knowledge based economy that can innovate and present prospects for further economic growth.

According to Babalola (2011), education provides human resources with the required knowledge, skills and competencies which makes them contribute to the development of the economy.

Growth theory highlights the influence of education to stimulating economic growth. The theoretical basis of education in economic growth comes from the endogenous growth theory. The endogenous growth theorists believe that investing in education can be linked to an increase in the efficiency and productivity of labour. Therefore, it is argued by the endogenous growth theorists that there is a need for government and private sector to incentive individuals to invest in education.

Figure 1 illustrates slow growth in the 1990s in Namibia, the interim period after independence, with GDP growth and per capita GDP growth averaging 3.6 percent and 1.1 percent, respectively. Nevertheless, there is evidence of accelerated per capita growth for the period 2001-2010, with output growth averaging 4.8 percent and per capita GDP growth averaging

3.1 percent (IMF, 2014). The mining sector and diamond mining in particular, have been one of the most significant contributors to growth over the years. The services industries remain the highest contributor to GDP with a share of over 50 percent and have increased marginally over the years. The public sector and wholesale and retail and trade sub-industries dominate the services industries, while the share of hotels and restaurant which is the proxy for tourism remains below 2.0 percent.

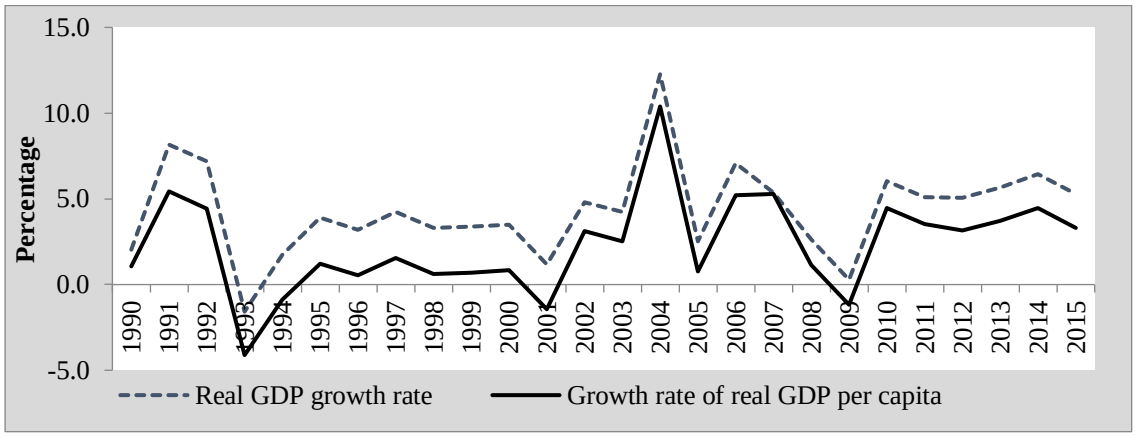

Figure 1: Growth rates of real GDP and real per capita GDP
Source: **Namibia Statistics Agency, 2014.**

The level of unemployment is 34% and stagnant with a third of the Namibian labour force unemployed. The youth age group which constitutes 45.2% of the labour force have the highest level of unemployment in the country. Moreover, due to the highly unskilled labour force, the majority of the employed are limited to low paying jobs in the agricultural and the private households sectors. In addition, about a third of the employed population in 2014 was in vulnerable employment (NSA, 2015), while skills mismatch has been suggested by many as the cause of the unemployment crisis.

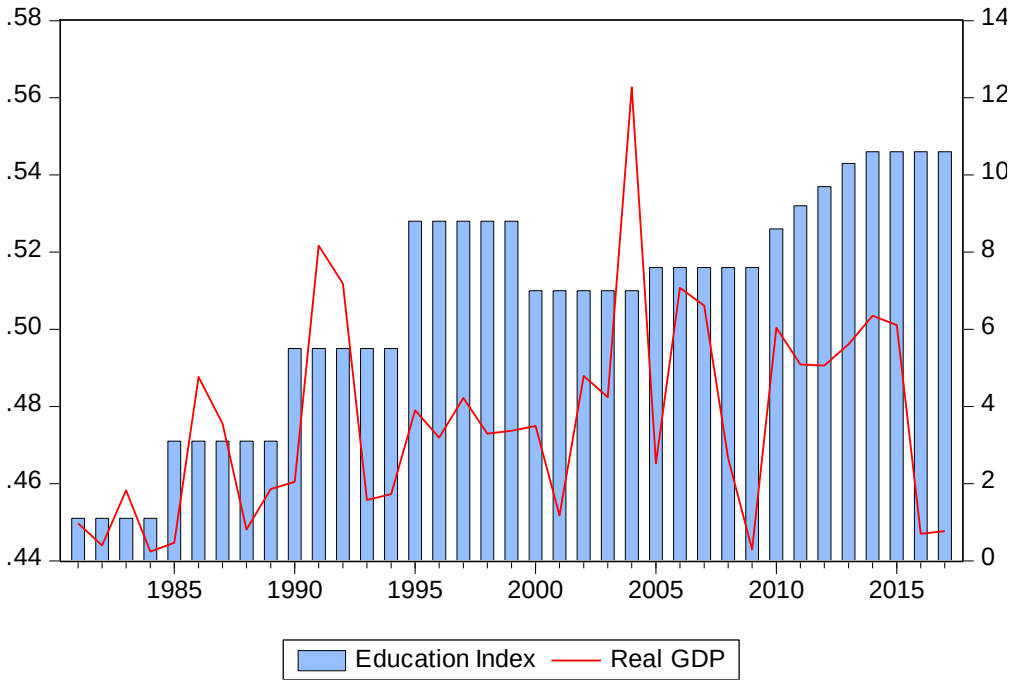

Figure 2: Education index and Real GDP, Namibia-1980 to 2017.
Source: **United Nations Development programme, 2018.**

Figure 2 indicates the relationship between the education index and real GDP which shows that from 2000 to 2008, tertiary education expenditures as a percentage share of real GDP ranged between 0.84% and 0.64%. A more considerable increase can be found in 2010 (1.93%), followed by a slight drop until 2016 (1.58%). Namibia's economic upswing resulted in higher tertiary government expenditures into tertiary education, which increased the tertiary enrollment rates and positively impacted the nation's education index.

The Namibian education system was designed consistent with apartheid in the pre independence period. The previously disadvantaged groups were excluded from benefiting from the provision of human of resource base which was supposed to promote equitable economic development across all races and ethnic groups. Hence policies were adopted with emphasis on basic education. The education system was reformed to provide effective, equitable and quality education to all Namibians. Education in Namibia has undergone various changes introduced to the curriculum, notably the learner based approach. This has been for

the purpose of growing a knowledge based economy that can innovate and present prospects for further economic growth. Namibia is among many nations around the world that need to fortify student preparation in secondary schools in elementary science subjects, mathematics and English. According to Katjavivi (2016), the need comes from a deficit inherited at the time of independence. Secondary schools are still confronted with the challenge of identifying and responding to the growing diversity of learning abilities, in order to expand the student base that will enter higher education.

In order to address these challenges the Namibian government introduced several policy changes. As stated above, among them are the learner -based education and recently, the introduction of new secondary school curriculum which will give learners an option of whether to end in grade eleven or proceed to Higher-Level classes (Ministry of education and culture, 2009). All these policy options have led to education to receive a large share of the national budget. These high levels of spending on education beg the question of whether education is having a meaningful contribution to economic growth in Namibia. The study attempts to use available data of the period 1980 to 2017 to interrogate the relationship between education and economic growth.

1.2 Problem Statement.

Theoretical literature assumes that education has a positive effect on economic growth, (Romer, 2006). Lawal and Wanab (2011), state that empirical literature depicts mixed results that education has an impact on growth although most studies agree with the theoretical literature. The results whether there is a causal relationship between education and economic growth are inconclusive.

In line with this theoretical argument, Namibia has committed itself to education. For example, the education sector received of N$15.35 billion of the national budget over the 2015/16 to

2017/18 whilst the second highest recipient, the health sector received N$6.49 billion, (Medium-term Expenditure Framework, 2018).

Kilambo (2015), found that the primary education, as well as the higher education and training pillars remain the weakest of Namibia's rank on the efficiency enhancers' pillars. These weaknesses persist despite, reforms that have been undertaken to improve the education sector. Education and Training Sector Improvement Programme (ETSIP) for instance was formulated as the education and training sector's response to the call of Vision 2030 (Mbumba, 2006). ETSIP was developed in response to weaknesses identified by the Namibian Government, and through a World Bank study in 2005, which highlighted the poor quality of education, untrained teachers, and unsatisfactory performance of learners. It is co-financed by the Government, development partners and the private sector. Its fundamental purpose is to extensively enrich the sector's contribution to the accomplishment of strategic national development goals, and to enable the transition to a knowledge-based economy and improve the quality, range and threshold of skilled labour essential to improve knowledge-driven productivity growth, and hence contribute to economic growth. ETSIP is expected to change the way Namibians learn and consequently result in school leavers being much better equipped for the labour market.

In 2017 a new curriculum was introduced in Namibian schools. According to Himarwa (2015), the new curriculum gives various opportunities to learners who complete grade 11 but do not meet prescribed requirements to proceed to Grade 12. The opportunities include entry into vocational education and training, direct entry to employment, or distance learning. After completion of Grade 11 (Ordinary Level), learners who meet the prescribed requirements will progress to Grade 12 and complete subjects on Higher Level. All these are attempts to enhance education as a catalyst for economic growth. Despite all these attempts, the International

Monetary Fund (IMF, 2014), has noted that skills mismatch in the Namibian labour market has contributed to the persistently high level of structural unemployment. Reducing skill-mismatches, through an improvement of the coverage and quality of education and vocational training, would play a central part in bringing the unemployment rate on a declining path therefore enhancing economic growth. Hence, skills development is critical to labour productivity which increases economic growth.

A number of scholars have shown a strong positive relationship between the quality of educational institutions and the level of economic development (Hall and Jones, 1999). According to Sachs (2005) the quality of education is a necessary prerequisite to enhancing productive economic activity. Therefore, if a significant proportion of the work-force has limited education, their ability to dynamically contribute in the economy is constrained.

With conflicting opinions regarding the link between economic growth and education it is not clear what Namibia's stand is, concerning this relationship. There are no earlier studies with the aim to establish the relationship between education and economic growth in Namibia. Several empirical studies have examined the relationship between economic growth and education. Most of these studies, however, have been cross sectional which includes developed and developing countries and there is limited literature on single country approach (Oladoyin, 2010). Since there is no empirical investigation done in this area for Namibia the focus of this study is to address this dilemma.

1.3 Objectives of the Study

The main objective of this study is to investigate the relationship between education and economic growth in Namibia over of the period 1980 to 2017. Furthermore the main objective is divided into two specific objectives:

1. To establish whether, or not, there exists a causal relation between education and economic growth in Namibia.
2. To test for cointegration and estimate the long-run relation between education and economic growth.

1.4 Hypotheses of the Study

H_0: There is no relationship between education and economic growth.

H_1: There is a relationship between education and economic growth.

1.5 Significance of the Study

This study is significant in more than one way. Firstly, the study may contribute to the scholarly debate on the relationship between the level of education and economic growth in general. Secondly, the study could be used by policy makers to justify the high level of public spending on education. Thirdly, the study could come up with meaningful recommendations as to some of the areas that require improvement in order for the education sector to be a meaningful driver of economic growth in Namibia. Thus the outcome of this study may also serve as a guide to policy makers in the Ministries of Education, Finance, and agencies interested in the development of the education sector and the economy.

1.6 Limitation of the Study

It is possible that there are some factors which cannot be quantified but do affect the relationship between education and economic growth and these could be said to be limitations of this study.

1.7 Delimitation of the study

The relationship between education and economic growth is affected by many factors like poverty, population, foreign aid, political instability and sociological factors. But due to limited data, the present study confines itself only to examine the relationship between education, gross fixed capital formation and economic growth.

CHAPTER TWO: AN OVERVIEW OF THE NAMIBIAN EDUCATION SYSTEM AND ECONOMIC GROWTH.

2.1 Introduction

Before Namibia's independence, the country's education system was created to support the Apartheid system rather than provide the required human resource base to promote equitable social and economic development. Katjavivi et al, (2016), indicated that Education was fragmented along racial and ethnic lines, in what was termed the Bantu Education system. A similar system was also being enforced in black communities in South Africa, with large inequalities in both the distribution of resources and the quality of education offered. This situation had a significant impact on the quality of education in the country.

2.2 The Apartheid Education System

After the assumption of power by the Afrikaner Nationalist party in 1948, black education was re-examined . Missionary schools were replaced by community schools with the intention to encourage the participation of African parents, the introduction of mother-tongue as the medium of instuction among the various African groups. According to Dalstrom (2002, the introduction of mother tongue as medium of instruction was the means of inculcating ethnic group consciousness and reinforcing the gulf between the white and black. Consequently, many of the primary schools run by the missions in remote areas were overcrowded, inadequately subsidized, with poor quality teachers and hence poor results and high rate of drop-outs. On the other hand, respected Augustineum College for Africans with superior education was established and drew learners from all over Namibia (Dalstrom, et al, 2002).

The imposition on Namibia of the apartheid educational system had two exceptional outcomes. First, it aided the occupying South African in their policy of disintegrating the African opposition into different so-called "population groups"; this was part of the openly expressed

policy of "bantustanization". Second, it had the consequence of keeping the African population educationally inferior to the whites, therefore in the view of the apartheid regime, less qualified blacks were less likely to assert their right to freedom and independence.

Africans realised that such an eductional system aim to entrench the domination of the oppressive and illegal South African regime (Leu, 1979). Thus, education under the apartheid government was accompanied by segregation of racial groups and the maintenance of white minority rule.

2.3 Transition from apartheid to post–independence education

After independence, the Government of the Republic of Namibia (GRN) constructed one integrated structure for education administration, from the earlier fragmented, ethnically based branches.

2.3.1 Post –independence education

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Curriculum policy in Namibia originates from different sources developed before and since independence. At least three key documents emerged in 1990 to lay the foundation for educational policy broadly and curriculum policy in particular: Draft Proposal for Education Reform and Renewal (1990), Education in Transition: Nurturing our Future (1990) and Change with Continuity: Education Reform Directive (1990). Other documents then emerged to elaborate earlier positions, such as Education and Culture in Namibia: The Way forward to 1996 (1991) and Pedagogy in Transition: The Imperatives of Educational Development in the Republic of Namibia (1991). The most important legal document for educational policy to emerge during early independence is the Namibian Constitution itself which in articles 3 and 20 respectively outlines the role of languages in schools and the rights of all children to education on a non-discriminatory basis (Ministry of Education and Culture 1992b:2).

With the aim to eradicate ethnic consciousness mother tongue including Afrikaans was replaced with English as the nation's official language henceforth selected as the medium of instruction in schools and other educational institutions. A learner-based curriculum for Grades 1 to 12 was developed and introduced by the National Institute for Educational Development (NIED). The learner-based education adapted the Cambridge IGCSE programme for senior secondary level. After the successful accomplishment of Grade 12, learners achieved a Namibia Senior Secondary Education Certificate. In order to pursue further studies one was required to obtain a good grade to meet the requirements of tertiary institutions both locally and abroad (Katjavivi, et al. 2016).

The Constitution directs the government to provide free primary education, and this was introduced across the country, and encouraged higher enrolment of learners. The changes implemented have brought about an enrolment rate of 95 percent of school-age children attending school and the number of teachers has increased by almost 30 percent since (NPC 2015).

Table 1 School enrolment numbers 2008-2015

Phases	2008	2009	2010	2011	2012	2013	2014	2015
Primary	408 937	409 944	408 621	410 761	417 310	426 850	420 861	435 472
Secondary	163 631	169 305	174 260	181 407	182 945	187 194	189 260	193 887
Total	572 568	579 249	592168	592 168	600 255	614 044	610 121	629 359

Sources: Annual education censuses

Currently, Namibia allocates more than 18% of its national budget to Education which represents 6 to 7 percent of Namibia's total GDP, thus making the country one of the three countries with the highest percentage of GDP directed toward education in the world. The largest share of the N$67.08 billion national total expenditure budget for 2015/2016, went to the education sector, with an allocation of N$11.32 billion (18% of the budget). As a result of

this investment, there is a total of 1,723 schools, of which 1,604 are government schools and 119 private schools, (Budget Statement, 2015).

It is important to note that the Namibian Government has given precedence to the provision of education throughout the post-independence period. Therefore, primary policy documents have highlighted continuously the importance of education and training. Article 20 of the Constitution (Republic of Namibia, 1990: 14-15), preserves the right to education, makes primary education compulsory and necessitates the State to establish and sustain schools at which primary schooling is delivered free of charge. Moreover, it establishes that children should stay in school until completing their primary education or until they reach the age of 16, whichever is sooner.

2.3.2 Vision 2030

The goal of Vision 2030 is to improve the quality of life of people of Namibia to the level of their counterparts in developed by 2030. In order to achieve this noble objective Vision 2030 went through different phases of craft implantation strategies and mobilizing, both human and financial resources. In this regard education and training feature prominently, so as to create a knowledge-based economy which will make Namibia an industrialized country by 2030 (Office of the President, 2004: 95).

Vision 2030 addresses inequality, concentrates on developing human and institutional capacities, and the effective use of natural resources, as well as good governance and cooperation between government individuals and communities. Education is central to Vision 2030 in order to ensure that Namibian society will be made up of literate, skilled, articulate, innovative, informed and proactive people.

In this sense, Vision 2030 contains three broad objectives for the education system (Office of the President, et al, 2004: 95). The first objective is to ensure an integrated, unified and flexible education and training system which is accessible to all Namibians from early childhood. The second objective is to achieve an affordable and pragmatic education and training system, capable of producing a balanced supply of human resources, in response to demands in the labour market. The third objective is to ensure that the society is comprised of people who are literate, skilled, articulate, innovative, informed and proactive.

Vision 2030 also contains concrete targets for the education and training system and identifies strategies for achieving these targets (Office of the President, 2004: 91). The first target is to expand access to secondary schools for the target age group by 2006. The second target is to provide all schools with drinking water and electricity with the necessary infrastructure. The third target is to equip all schools with school furniture and there should be at least one teacher for every 35 learners in primary schools, for every 30 learners in secondary schools.

Vision 2030 also states that by 2030 Vocational Training Centres should be established in all regions. This should enable the literacy education rate for adults to reach 100% by 2030. In order to achieve gender balance in every aspect, Vision 2030 highlights eradicating gender disparities in primary and secondary education and achieving gender equality in education, emphasizing girls' full and equal access to and achievement in basic education of good quality (Office of the President, 2004: 98-99).With the introduction of inclusive education, the article authenticates the need to provide those who live with disabilities, access to lifelong learning by 2030. Furthermore, the document explicitly emphasises the importance of ensuring access to high-quality Early Childhood Development (ECD) using the curriculum and programme

development and capacity building among caregivers and trainers (Office of the President, et al, 2004: 98-99).

2.3.3 National Development Plan

Namibia's National Development Plan explains what Vision 2030 is and outlines some policy priorities for the education and economic sectors hence positioning the country's overall development. The principle of sustainable development permeates NDPs. As such the plan frames the achievement of progress within a framework of ensuring the ability of future generation to thrive. NDPs consists of goal which includes good governance through effective institutions and ensuring sustainable environment and enhances resilience (NPC, 2012).

The national development plan (NDP4) acknowledges the realities of wide-ranging quality problems in the education and training system and a mismatch between the demand for and the supply of skills in the country (NPC, et al, 2012). Specific mention is made of the country's considerable investment in education and of the need to ensure that it achieves the expected returns on these investments, so that this expenditure requirement remains manageable and its yields positive". Research and development is an important driver of innovation and economic growth, therefore, one of the NDP's strategic initiatives for education include "centres of excellence" and "more applied research" (NPC, et al, 2012).

The NDP4 for instance, acknowledged education-related challenges which include quality of graduates from all levels of education that remains below desired levels and limited provision and affordability of Early Childhood Development centres and educators. In addition to that there has been an insufficient provision of vocational and technical education, as well as uninformed and inaccurate perceptions of vocational and technical education.

Namibia aspires to achieve and average annual GDP growth of 5 per cent during the NDP5. The economy is projected to move from an input-dependent economy into a knowledge-based economy hence the emphasis of research and development, skills development, diversification of economic activities (NPC, 2017). In order to achieve accelerated economic growth, Namibia has initiated structural transformation through industrialization, expansion and modernization of physical infrastructure, strengthened export capacity and supportive financial infrastructure for greater inclusion (NPC, et al, 2017).

Within these contexts, Namibia commits itself to enhancing growth and economic diversification while addressing challenges that include a high degree of regulation and a mismatch between the skill levels in Namibia's work-force and the skills demanded by the labour market.

2.3.4 Education and Training Sector Improvement Programme (ETSIP)

Despite the fact that many teachers are mostly amply equipped for the task, there are still a lot who need further training. Some schools do not consistently perform as expected, hence there is a high failure and dropout rate. As a result of such performance the Government of the Republic of Namibia commenced ongoing reform initiatives, in order to further fortify and transform the system of education in the country (World Bank, 2005). The Government has established such initiatives within the policy framework of ETSIP. This initiative is a fifteen-year strategic plan intended to improve quality and effectiveness in the education sector, beginning from pre-primary to tertiary levels.

ETSIP was established in response to the shortcomings identified by the Namibian Government which highlighted the poor quality of education, untrained teachers, and unsatisfactory performance of learners (World Bank, et al, 2005). ETSIP aims to align the education system with Namibia's Vision 2030, the Government's long-term plan to transform Namibia into an

industrialised society. Vision 2030 addresses inequality, concentrates on developing human and institutional capacities, and the effective use of natural resources, as well as good governance and cooperation between government, individuals, and communities. Education is central to Vision 2030 in order to ensure that Namibian society will be made up of literate, skilled, articulate, innovative, informed and proactive people. Furthermore, the Namibian government has now embarked on an extensive programme of developing early childhood educations centres (NPC, et al, 2012).This is aimed at preparing children for formal education as well as enhancing their care and meeting their nutritional needs.

2.4 Summary

There are many improvements that have been made to the Namibian education system despite the past injustices of the apartheid system. The link between education and economic growth is not easily discernible, hence econometric analysis is required to statistically assess the link. The study looks at the theoretical and past empirical literature that were done in previous studies.

CHAPTER THREE: LITERATURE REVIEW.

This chapter examines the theories underpinning this study and analyses past studies on the theoretical connection between economic growth and education. It also reviews empirical works on the relationship as well. The chapter is therefore divided into two sections. The first section presents the theoretical literature review and the second section presents the empirical literature review.

3.1 Theoretical Literature Review

The basic economic growth model incorporates capital and labour as the principal factors of production. Hence output is stated as a function of these two factors. The level of capital investment is subject to savings and is calculated by multiplying the mean rate of saving in an economy by output. As labour and capital rise, output increases.

3.1.1 Harrod-Domar Growth Model

Economists Evsey Domar and Roy Harrod individually created an economic growth model founded on a fixed-coefficient in the early 1940s. According to Dwight (2006), Harrod-Domar growth model is constructed on the assumption that labour and capital and are persistently utilized in a fixed percentage to generate equal amounts of output (Mixon and Sockwell, 2007). Two imperative sides of growth of the Harrod-Domar model are the efficiency of capital and its usage in investment and savings. It has been of great use mostly in developing economies to decide the critical rate of investment to obtain a preferred growth rate. This is because this model has an advantage of being able precisely to forecast growth in the short run.

On the other hand the model, is not ideal in the absence of optimal employment of factors of production specifically, labour and capital. Therefore this leads to inaccuracy of economic

forecasts in the long run. Inevitably it fails to explain changes in technology and efficiency advances that are otherwise required for sustained economic growth and development.

3.1.2 Neoclassical Growth Model

Dwight (et al. 2006), stated that the Neoclassical Growth Model was developed as model of growth which addressed the shortcomings of Harrod- Domar model by Robert Solow in the 1950's. Solow replaced the constant-coefficients production function with a production function which displays the characteristics of constant returns to scale and continuous diminishing returns to each factor of production. This production function is curved as opposed to the L- shaped isoquants hence allowing dynamism in using a varied proportion of capital and labour. Production in the model can be increased by increasing labour and capital in fixed quantities fixed or by increasing either in capital or labour. The production function in this model depicted increasing knowledge or technology as labour complementing and expanding production (Mixon and Sockwell, et al, 2007).The assumption is that technology increases autonomously from the model in two ways which include mechanical through upgraded machinery and human capital through improved health, education and worker skills. Major components of growth in the economy are technical change and population expansion. The model emphasised the importance of research and human resource development, including education and mechanisms for accumulating technological progress

3.1.3 Endogenous Growth Model

The Endogenous Growth Model by Romer (1990), is an extension of the Solow Model, allowing for constant growth through endogenously determined productivity. The driving force behind this theory was that Solow's model though correct and sensible was incomplete and therefore there was a need to develop a more complete theory. According to Cortright (2001), this theory is an assessment of the economy that incorporates two key points. Firstly, it sees

technological advancement as a result of economic activity. Secondly, technology and knowledge are characterized by increasing returns which determine the process of economic growth. It generates sustained growth by assuming that technological change has the unintended results of specialising in a firm's investment. According to this model, labour is an input that needs investment in the form of human capital. According to this model human capital was the measure of the cumulative effect of activities such as acquiring formal education and on-the-job-training .Therefore enhancement of human capital has positive externalities and spill–over effects leading to economic growth as a result of the development of new forms of technology and efficient and effective means of production (Bot, 2014). Thus Endogenous Growth Theory is based on the notion that increases in efficiency can be tied directly to innovation and additional investment in education. The theory highlights the need for government and private sector institutions that successfully promotes innovation, and that provide the right motivation for individuals and businesses to be inventive. Technology creates the capacity to produce more specialised intermediate products (Cortright, et al, 2001).

3.2 Empirical Literature Review

Endogenous growth literature has attracted many researchers to examine the empirical results of the relationship between education and economic growth. The studies adopted several methodologies such as co-integration, Granger Causality, vector auto-regression and the error correction model. The results of these studies are diverse though most point to a positive relationship between education and economic growth. The central element of human capital is education hence many studies refer to education as an investment in human capital.

3.2.1 Cross-Country studies

Mankiw, Romer and Weil (1992), estimated the Solow model augmented with human capital. They assumed the production function for human capital to be the same as for physical capital, that is, human capital in a current period depends on human capital in the previous period, investment in human capital and the depreciation rate, which equals the depreciation rate of physical capital. They restricted the investment into human capital to the investment in education. In the study, the value of human capital was mainly determined by the investment in education, which was a very strong assumption. They found that the Solow model augmented with human capital explained the cross-country variation in income better than the original model, which accounted for only physical capital and labour.

Barro (1991), finds that the initial level of human capital (proxied by 1960 enrolment rates) is positively related to growth in real per capita GDP for the period 1960-1985. In the study the growth in per capita GDP was regressed on several factors, including enrolment rates but considered that enrolment rates could not be sufficient proxies for education.

Later studies by Barro and Lee (1996), used estimates of educational attainment as a proxy for human capital. Nevertheless, educational attainment as a proxy for human capital also has some shortcomings. Firstly it does not take into consideration the quality of education and secondly, it is only one part of the stock of human capital that an individual possesses. The other part is the experience gained after formal education, and that was not taken into consideration in the study.

To study how the quality of education relates to economic growth Hanushek and Klimko (2000), conducted a cross-country analysis using international test scores in science and

mathematics and found that test scores were positively related to growth rates of per capita real GDP.

Barro (2000), obtained the same result using a different data set. Two relevant facts that can be pointed out from these two studies suggest that the test scores are useful for explaining per capita growth in real GDP. The correlation of average years of schooling with the test scores in 1995 in Barro-Lee data-set is low and both the test scores and the average years of schooling are insignificant when included in growth regression. This indicates that test scores provide additional information and test scores and average years of schooling can explain GDP growth better than average years of schooling alone.

Lucas (1988), took into account human capital as the same as other variables in the production function, not substantially different from physical capital, but human capital is only formed by workers though formal education and on- the- job training. Constant returns to human capital formation are assumed and this is founded on the argument that workers' knowledge 'spills over,' and the model can attain a positive steady-state rate of growth rate in labour productivity. Romer (1990), for instance, stated that human capital was the measure if the cumulative effect of activities as acquiring formal education and on-the-job training. Goode (1959), argued that the most critical factor in increasing the stock of human capital is education.

Szirmai (2005), stated that the human capital theory advocates the support of national development by means of providing higher education. Supporters of this method argue that investment in higher education promotes productivity and technological advancement, consequently benefiting the nation as opposed to the individual.

3.2.2 Studies in Africa

Babatunde and Adefabi (2005), explored the link between education and economic growth from 1970 to 2003. The study employed the Johansen co-integration technique and the vector error correction. The results suggested that there is a long-run relationship between education and output per worker. It was revealed that a well-educated labour force significantly influenced economic growth positively. Similarly, the results of Oluwatobi and Oluranti (2011), suggested a positive relationship between regular government expenditure on education and economic growth, thus confirmed the dependence of economic growth in the long-run on governments recurrent expenditure on education in Nigeria. The same results were obtained by Dauda (2010), for Nigeria Mudaki and Masaviru (2012), for Kenya.

Neeliah and Seetanah (2016), provided evidence that human capital formation was an important growth factor for the Mauritian economy over the period of 1970 to 2012, hence bringing additional confidence to the endogenous growth theory, and also maintenances the initial hypothesis that education has positively contributed to economic growth in Mauritius over four decades. This study shows that education is a significant growth determinant in Mauritius, with the human having a long-run output elasticity of 0.36. In the long run, it could be interpreted that a 1 per cent increase in the human capital index would increase GDP by 0.36 per cent.

Several studies have looked at an empirical analysis that focus on the relationship between education and economic growth in countries such as Uganda (Wanjala and Belassi, 2004), India (Self and Grabowski, 2004; Ray 2013), Bangladeshi (Muktadir-al-Mukit, 2012), Malaysia (Shaihani, Harris, Ismail and Said, 2011), Pakistan (Afzal, Farroq, Ahmad, Begam and Quddus,

2010; Chaudhary, Iqbal & Gillani, 2009), China (Chi, 2008; Kaur, Baharom and Habibullah, 2014), Taiwan (Liu and Armer, 1993;Tallman and Wang, 1994), Turkey (Mercan and Sezer, 2014), Italy (Villa, 2005), Portugal (Pereira and Aubyn, 2009), Russia and Ukraine (Ararat,, 2007), and Greece (Magoula and Prodromidis, 1999; Asteriou and Agiomirgianakis, 2001).

In Uganda Wanjala and Belassi (2004), explored the effect of government spending on education using time series data for the period 1965 to 1999. It was found that average expenditures on education per worker was positively correlated with economic growth leading concluding that there is a positive relationship between education expenditure drives economic and economic growth in Uganda.

3.2.3 Studies in Asia

Self and Grabowski (2004), investigated the impact of different education levels on India's economic growth. They used data for the period 1966 to 1996 using enrolment ratios as a proxy for the flow of education. The study was postulated on the notion that changes in education are accountable for changes in the economic growth. The relationship between education level and economic growth was tested if different when the population is divided into groups by gender. The study also measured the variation of the mean in the years of education at each level of education. This measurement essentially signifies the growth rate of human capital stock. The study proved that primary and secondary education is strongly correlated with the economic growth of the country and has a strong causal impact on the economic growth in India. Also the analysis also confirmed that education levels are related to each other. On the contrary, the levels of education show differences in respect to their impact on economic growth since tertiary education does not seem to have a causal impact on the economic growth.

Raja (2000), stated that education increases economic growth whilst reducing poverty and increasing productivity. It should, therefore, be the first step in the path of the development process as it plays a vital role in the building of human capabilities and enhances economic growth through skills and knowledge. Investors are more interested in a country that possesses sufficient stock of human capital. It is unlikely that nations can develop in the absence of education. Ray (2013), stated that no Granger causality that exists between education and economic growth in India.

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In Bangladesh Muktadir-al-Mukit (2012), examined the impact of public expenditure and economic growth. The results of the study found a positive and significant relationship between public expenditure on education and economic growth in the long-run.

In Malaysia Shaihani, Harris, Ismail and Said (2011), examined the impact of education on economic growth for the period 1978-2007 using Autoregressive Distributed Lag ARDL modelling approach. The study indicated that primary and tertiary education showed a negatively significant relationship with economic growth in the short-run but in the long-run only tertiary education showed a positive and significant impact on economic growth. On the other hand secondary education had a significant positive relationship with economic growth in the short-run. In Romania, Danacica, Belascu & Llie (2010), explored the causal nexus between higher education and economic growth using time series data from 1980-2008. The results of the study showed that there is a long-run relationship between higher education and economic growth and one way causality i.e. running from economic growth to higher education has been observed. Temple (2000), investigated the impact of education on economic growth and found that there is more significant benefit of education resulting in high productivity reflecting the positive influence on economic growth.

In Pakistan Afzal, Farroq, Ahmad, Begam and Quddus (2010), explored the short-run and the long-run relation between education and economic growth. The study used annual data relating to 1970-72 to 2008-09 and found evidence of co-integration between education and economic growth using ARDL. It was found that, both in the long-run and short-run, there exists a direct relationship between education and economic growth. In the short-run, an inverse relationship was found. However the results of Afzal, Malik, Begum, Sarwar and Fatima (2012), established that education affects economic growth positively and significantly in the long run only and that bi-directional causality between education and economic growth exists.

Riasat, Atif and Zaman (2011), examined the impact of education expenditure on the economic growth of Pakistan over the period 1972 to 2010. The study used the bounds testing approach, and the results showed that education expenditure has a positive and significant impact on economic growth in the long-run. Abbas and Peck(2008), showed that the primary education has an adverse effect on economic growth in Pakistan and Sri Lanka while secondary and tertiary education have a positive and statistically significant impact on economic growth in both countries.

Chaudhary, Iqbal and Gillani (2009), used time series data to investigate the causality between higher education and economic growth in Pakistan for the period of 1972 to 2005. The study employed Johansen co-integration approaches in a Vector Auto Regressive (VAR) framework and Toda-Yamamoto (1995), causality technique in the analysis. The results of the co-integration approach confirm the long-run relationship between education and RGDP. Causality results confirm the unidirectional causality from RGDP to higher education.

Musibau and Rasak (2005), investigated the relationship between education and economic growth. The study was for the period 1970-2003, and the Johansen Cointegration technique was employed. The results of the study indicated a positive and significant effect of education on economic growth as a factor of production.

In China Kaur, Baharom and Habibullah (2014), investigated the relationship between education and economic growth. The study used annual data for the period 1970-2005 by employing econometric techniques. Using a vector error correction model (VECM) and dynamic ordinary least squares (DOLS) the results of the study showed that there is a long-run relationship between education and economic growth. The evidence indicated a uni-directional causal relationship, running from income level to education expenditure. Chi (2008), showed that higher education has a positive and more significant impact on GDP growth than primary and secondary education in China.

Tallman and Wang (1994), showed that higher education has a greater positive impact on growth about primary and secondary education for the case of Taiwan. On the other hand Liu and Armer (1993), found that both primary and junior secondary education increase economic growth in Taiwan, but senior secondary and tertiary education did not exert any significant effects on growth.

3.3.3 Other studies

In Turkey Mercan and Sezer (2014), investigated the relationship between education expenditure and economic growth for the period 1970-2012. The study used the bounds test approach, and the results showed a positive relationship between education expenditure and economic growth.

In Italy Villa (2005), examined the effect of the three levels of education on economic growth and established that the higher and secondary education has a positive effect on economic growth, while the primary has no significant effect. In Portugal Pereira and Aubyn (2009), showed that primary and secondary education has a positive impact on GDP, while higher has an adverse effect.

Ararat (2007), investigated the relationship between education and economic growth in Russia and Ukraine. The study employed the endogenous growth model and a system of linear and log linear equations. The results showed that there was insignificant impact of education on economic growth, on the other hand, it was found that tertiary education has satisfactory results for income per capita growth in the long run.

In case of Greece Magoula and Prodromidis (1999), investigated the impact of education on economic growth and found that the impact of secondary and higher education on economic growth compared to primary education contribution to growth had risen for the period 1960's to the 1980's. However, Asteriou and Agiomirgianakis (2001), found that the growth of enrolment rates in primary, secondary and higher education positively affected the GDP in Greece for the period 1960-1994.

Some researchers investigated the effect of education on economic growth by grouping countries. Such researchers include Mobolaji (2010), Gyimah-Bempong, Paddison and Mitiku (2005), Krueger and Lindahl (2001), Agiomirgianakis, Asteriou and Monastiriotis (2002). According to Mobolaji (2010), Human capital and financial development are twin needed for acceleration of growth in Sub-Saharan Africa. However, it is suggested that human capital is more important for growth than financial development. The study is a panel data one that uses

the augmented Solow model to investigate the effects of financial development and human capital on the economic growth in Sub-Sahara Africa for the period of 1970-2000. The diagnostic test showed that the model is well specified and the appropriate technique used. It was shown that human capital impacts positively on growth, this agrees with Barro (2001), but financial development does not have much impact on economic growth in the countries for the period under review. Gyimah-Bempong, Paddison and Mitiku (2005), examined the effect of higher education on economic growth. In African countries. Panel data was used for the period 1960-2000 and evidence of the study indicated that all levels of education have a positive and statistically significant effect on the growth rate of per capita income in African countries.

Krueger and Lindahl (2001), divided countries into three groups based on education levels. They found a statistically significant positive relation between education and growth first for the countries with the lowest level of education. They explored a quadratic relationship between economic growth and years of education. They discovered that for low levels of education, education contributes positively to growth, but for high levels of education it weakens the rate of growth. The marginal effect of education on economic growth is positive for countries where the average worker spends less than 7.5 years in education. Above this marginal education has a negative effect; the average level of education in the OECD is 8.4 years, so incremental education is expected to depress the growth rate in OECD countries. These findings are consistent with results provided by Barro (1997). McMahon (1998), explored the impact of the primary, secondary and tertiary levels of education on economic growth for a sample of Asian countries and established that tertiary education has a negative effect on economic growth however primary and secondary education have a significantly positive effect. According to Pancavel (1991), the impact of the several phases of schooling

namely primary, secondary and higher education can be concluded from an entire measure of the schooling and efficiency. The evidence presented that while the contribution of overall schooling increased to 23.41 from 14.78, the growth in tertiary education and its contribution to economic growth in the US was much larger. It was observed that the share of higher education to economic growth had increased greatly in the 1990s. Agiomirgianakis, Asteriou and Monastiriotis (2002), investigated the role of education on economic growth. The study used panel data consisting of 93 countries and employed dynamic data approach in a Generalised Methods of Moments (GMM) setting. Since the lagged dependent variable was included, the GMM was used. This is because the GMM can overcome the problem of lagged dependent variable being correlated with the error term which is likely in an ordinary least square (OLS) model and would render the OLS estimation biased and inconsistent. The study showed that as the level of education advances the effect of education on economic growth is strengthened.

Arabi and Abdalla (2012), state that investment in education increases labour force capacity to produce. Since better-educated workers are more literate and numerate, they should be easier to train, and to learn more complex tasks, better work habits regarding awareness and dependability. Education causes an individual to earn more and become productive. Therefore a rise in the average level of education of the nation's workforce would be expected to increase national income.

Kim and Terada-Hagiwara (2010), highlighted the significance of a well-educated labour force because it's considered to be necessary for the adoption of new technology and new methods of production. It plays a vital role in developing countries as they have shortages of physical and human capital. The demand for skills which is directly related to the quality and quantity

of education is critical for economic growth. There is a thresholds effect on the relationship between education and economic growth (Kim and Terada-Hagiwara, et al, 2010). Primary education and secondary education does not have a significant positive impact on economic growth while higher education has significant positive effect on economic growth.

High quality primary education and secondary education is the premise of high-quality higher education. Education improves human resources and human capital formation, thereby improving the productivity of workers who learn new skills and perfect old skills (Nnadozie, 2008). Education contributes to economic development because it builds human capital and enables workers to improve their productivity, hence contributing to overall economic growth. Employment is more accessible to individuals with education which in turn reduces poverty. Education is vital to all, especially in a globalized world where education is important at all levels. A lack of it can result in a nation being isolated and therefore leading to stunted economic growth.

3.3 Summary

Education is seen not to have a role in traditional neoclassical economic growth theories, however, the Endogenous Growth Theory plainly puts the significance of education to the fore. It is used to explain the importance of education in economic growth models. In the Endogenous Growth Model, education is seen as contributing to the expansion of the economy by increasing workers' productivity and also by resulting in knowledge creation, ideas and innovation. Education improves human capital by increasing both individual productivity levels and increasing employment opportunities. This is unlike the early neoclassical approaches who assumed that technological change was driven by factors beyond our control. Therefore it becomes harder to see the role that would be played by education in such model. This is one of the weaknesses of the neoclassical approaches.

There are however contrasting outcomes in empirical literature as to whether or not education leads to economic growth. Studies have tested whether the theories hold empirically but gave mixed results. For instance, Babatunde and Adefabi (2005), using the Johansen cointegration technique and the vector error correction indicated a link between education and economic growth on the other hand, Aubyn (2009), showed that primary and secondary education has a positive impact on GDP, while higher has a negative effect. In another study by Ray, et al, (2013), stated that there is no Granger causality that exists between education and economic growth. In addition to that, Abbas and Peck (2008), revealed that the primary education has a negative effect on economic growth. Therefore the causality results are inconclusive because there is no clear direction. The present study attempts to examine this relationship in Namibia as the reviewed literature should not be wholly generated to Namibia.

The empirical literature also shows a number of methodological shortcomings in the estimation of education variables on economic growth. Various indicators of education such as total amount of expenditure on education, school enrollment, college enrollment, University enrollment and total enrollment in all eduction institutions are being used in literature such Muktadir-al-Mukit al. et, (2012) in Bangladesh and Mudaki al. et, (2012) in Nigeria. They examined the impact of public expenditure and economic growth, to measure the effect of education but public expendiuter does not capture the whole effect of education. Hence the present study uses the education index as a source to measure education since it is a comprehensive mesure of education. Afzal, Rehman, Farooq and Sarwar (2011) already used the education index to measure education.

Although there is a prevalent belief that indeed education causes economic growth, the hypothesis has been generally weak. Most empirical work in this area has been cross country

regressions which groups both developing and developed economies together resulting in overlap in the data sets and specifications utilised by the various studies which could explain the mixed results in empirical work.

CHAPTER FOUR: METHODOLOGY

4.1 Introduction

In the previous chapter, literature review was done to examine the relationship between education and economic growth. The exploration establishes that the relationship can run either way. Hence this chapter presents the methodology followed by the techniques applied to investigate the relationship between economic growth and education.. The first section describes a suitable research design and steps involved, followed by dataset representation and description. The third part describes the empirical techniques applied.

4.2 Research design

There are some factors that affect GDP, hence factors such as gross domestic capital formation are considered though the main area of interest is education. The techniques applied in this chapter are informed by empirical literature. In this regard, an overview of Augmented Dicky-Fuller (ADF) and the Phillips Perron (PP) tests are discussed. Autoregressive distributed lag (ARDL) model and Granger causlity tests are also employed in this study. This chapter also discusses the theoretical framework of the study.

4.3 Research Methods

4.3.1 Data Sources and Description

As indicated above, the study uses time series data on Annual GDP, Education index, and Gross Fixed Capital formation based on constant 2010 (U$ Dollar) obtained from the World Bank for the period 1980 to 2017. E-views software which has proved to be an interactive tool for statistical and econometric analysis. The choice of the starting period was constrained by the accessibility of data aand historical milestone as well. The collected data was imported into E-Views, and analysed. The study calculated the descriptive statistics to describe the nature of

annual time series data of real GDP growth, Education index and Gross Fixed Capital formation. All the variables are real and in log transformed form.

4.3.2 Measurement of Variables

Variables chosen are informed by the literature and relevance to the Namibian context.

Real Gross Domestic Product

Real gross domestic product (real GDP) denotes the total value of goods and services produced within the borders of a country, regardless of who owns the assets or the nationality of the labour used in producing that output. The growth of output is measured in real terms. Real GDP is a proxy used to measure economic growth. Economic growth is a phrase used to indicate the increase in real GDP or in per capita GDP. This proxy is supported by prior studies such as Katircioglu (2009) and Jin (2008). Real GDP is transformed by taking the natural logarithm (ln) to transform a highly skewed variable to one that is more approximately normal by removing an underlying trend. The model is adopted from Azal et al. (2012), given the similarity in variables.

Education

There is no universal measure for Education, therefore it is measured by various indicators such as literacy rate, primary school enrolment, secondary school enrolment, tertiary enrolment and total expenditure on education.

In the present study the education index is used to measure education. it comprises of , adult literacy rate (ALR) with two-thirds weighting and the combined primary, secondary, and tertiary gross enrollment ratio (GER) with one-third weighting are added together. The adult literacy rate gives and indication of the ability to read and write, while the GER gives an indication of the level of education from kindergarden to postgraduate education. Afzal,

Rehman, Farooq and Sarwar (2011) already used the education index as a source to measure education.

Education Index=2/3*ALI + 1/3 GEI

Adult Literacy Index (ALI)=(ALR - MIN) / (MAX-MIN)

Gross Enrollment Index (GEI)=(GER - MIN) / (MAX-MIN)

Where:

ALI= Adult Literacy Index

GEI =Gross Enrollment Index

ALR= Adult literacy rate

GER =Gross Enrollment Ratio

Gross fixed capital formation

Gross fixed capital formation is the expenditure by government, private and public corporations on new fixed assets in addition to net expenditure on second-hand fixed assets ithin a time period. GFCF deflated by GDP deflator is a proxy for capital investment, and this proxy has already been used by earlier studies such as Abbas and Peck (2008) and Khorasgani (2008). If a positive relationship between GFCF and RGDP is achieved, then it will be consistent with a Keynesian approach which supports investment promotion as a source of economic growth.

4.4 Theoretical Framework and Model specification

Taking into account the theoretical postulates of the relationship among Real GDP, Gross Fixed Capital Formation and Education the following analytical model is specified as:

$lnRGDP = f(lnGFCF, lnEdu)$

In order to determine the link between Edu and RGDP, the log-linear form for the variables RGDP and Edu are specified as

$$lnRGDP = \gamma_0 + \gamma_1 lnEdu + \gamma_2 lnGFCF + \varepsilon_1 \quad (1)$$

Where:

ln = Natural logarithm

RGDP =Real gross domestic product

This is a proxy used to measure economic growth which has been earlier by Afzal, Rehman, , Farroq & Sarwar (2011), Chaudhary, Asim & Gillani, (2009*)*, Abbas, & Peck, (2008) and Katircloglu, S. (2009)

GFCF =Gross fixed capital formation

GFCF has been used as proxy , Chaudhary, et al, (2009*)*, Afzal, et al, (2011), Abbas, et al (2008).

Edu =Education

Education index is a comprehensive mesure of education which capture the whole effect of education. Education index was constructed by using UNDP methodology developed in 1999-2000 for the period of 1971-72 to 2009-2010. Various indicators of education such as total amount of expenditure on education, school enrollment, college enrollment, University enrollment and total enrollment in all eduction institutions are being used in literature to measure the effect of education but they do not capture the whole effect of education. Eduction index as a measure of education has already been used by Afzal, et al, (2011).

ε =Error term

All the three variables are changed to logarithms for the purposes of the current study. This is to eliminate any uncertainty of non-linear relationship between variables and allow coefficient interpretations.

4.5 Data analysis

4.5.1 Stationarity

Time series data often contain a unit root, and if analysed econometrically, such results may be spurious. This is because most time series data are non- stationary in levels. It is therefore important to test for the presence of unit roots. A number of tests are employed to test for unit roots in time series data. This study uses unit root tests to test for the stationarity or non-stationarity of the series. The Augmented Dicky-Fuller (ADF) and Phllips-Perron (PP) are used in this regard.

Dickey and Fuller (1981) formulated the procedure of testing for non-stationarity (unit root). The ADF test is one that tests for a unit root in a time series sample and is considered reliable. The ADF is used to determine the order of integration. The test cannot discriminate between stationary and non-stationary series with a high degree of autocorrelation, in addition, it does not consider heteroscedasticity and non-normality. The ADF tests utilises a parametric autoregression to approximate the ARMA structure of the errors in the regression and also assumes the error terms are independent with a constant variance.

To detect the presence of unit roots the ADF test utilized is specified as follows:

No constant, no trend: $\Delta Y_1 = \phi_1 Y_{t-1} + \sum_{i=1}^{n} W_1 \Delta Y_{t-1} + \varepsilon_{1t}$ (2)

Constant, no trend: $\Delta Y_1 = \alpha_1 + \phi_1 Y_{t-1} + \sum_{i=1}^{n} W_1 \Delta Y_{t-1} + \varepsilon_{1t}$ (3)

Contant and trend: $\Delta Y_1 = \alpha_1 + \phi_1 Y_{t-1} + \lambda_t + \sum_{i=1}^{n} W_1 \Delta Y_{t-1} + \varepsilon_{1t}$ (4)

Where:

Yt= series at time t

Δ= first difference operator

α ϕwλ=parameters

ε= stochastic term-assumed to be homoscedastic.

Phillips and Perron (1988) developed some unit root tests that have become important in the analysis of economic time series data. The Phillips-Perron (PP) unit root tests deal with serial correlation and heteroskedasticity in the errors. While the ADF tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression. The PP tests are advantageous over the ADF tests in that the PP tests are robust to general forms of heteroskedasticity in the error term ut. Another benefit is that the user does not require to specify a lag length for the test regression.

4.5.2 AutoRegressive Distributed Lag Bounds approach to cointegration

AutoRegressive Distributed Lag (ARDL) approach also refered to as the bounds test to integration has advanced by Pesaran and Pesaran (1977), Pesaran and Shin (1999) and Pesaran et al. (2001) is employed in the study.

The ARDL approach has some advantages compared to other co-integration techniques. Firstly, it does not require prior testing of the series to determine the order of integration since the test can be can be applied irrespective of whether the when the variables are of I(0) or I(1) or mutually integrated, while still, it is pre-requisite that none of the variables is of I(2) or higher order. Secondly, it takes care of the problem of endogeneity. This implies that both the long-run and short-run parameters of the model are estimated jointly.Applying ARDL is useful in data generating process through taking sufficient number of lags general-to-specific modeling framework. The ARDL technique also accommodates a larger number of variables and the error correction model (ECM) can be derived from the ARDL model via a simple linear transformation. This approach performs better and gives more robust results in case of

the small data set. In the current study the ARDL bounds testing approach is applied to examine the cointegration by conducting F-statistic.

The ARDL approach is in two phases. In the first phase, the existence of the long-run relationship between the variables under consideration is tested by calculating the F-statistic which is then compared with the lower and upper bounds F-Bound statistics. The distribution of this F-statistic, nevertheless, is non-standard irrespective of whether the regressors are I (0) or I(1). Pesaran et. al, (1997) provided two sets of critical values for the test of co-integration. The lower critical bound assumes all the variables to be I (0), implying there is no co-integration among the variables. The upper bound, on the other hand, assumes all variables to be I (1). If the computed F-statistic is greater than the upper critical bound, then the null hypothesis will be rejected implying the existence of a co-integrating relationship among the variables. If the F-statistic is below the lower critical bounds value, then it denotes that there is no co-integration relationship. With the aim of obtaining the optimal lags for each variable the ARDL approach estimates $(p + 1)^k$ number of regressions, where p represents the maximum number of lags to be used and k is the number of variables in the equation. The model is carefully chosen based on the Schwarz-Bayesian Criterion (SBC) or the Akaike Information Criterion (AIC). The SBC uses the smallest possible lag length and it is considered as the most parsimonious model, on the other hand, the AIC selects the maximum necessary lag length. After establishing co-integration from the ARDL model , the long-run and error correction estimates of the ARDL are then obtained. The diagnostic test statistics of the selected ARDL model can then be examined from the short-run estimates at this stage of the

estimation procedure. The stability of the parameters of the model is tested by using the CUSUM test. The Schwartz-Bayesian Criteria (SBC), the Akaike Information Criteria (AIC), or the Hannan and Quinn (HQ) criterion are then used to select the orders of the lags of the

ARDL models. Once co-integration relationship is established, the designated long-run ARDL model can be estimated in order to obtain long run coefficients and their asymptotic standard errors. The long run estimation investigates the impact of each variable with the dependent variable.

After estimating the selected long-run ARDL model, the next step is to then estimate the short-run elasticities of the variables within the framework of the error correction model (ECM) representation of the ARDL model. The speed of adjustment to equilibrium is determined by the coefficient of the ARDL model which is supposed to be negative and significant for it to be interpreted. The existence of the long-run relationship among the variables requires the estimation of the unrestricted ARDL error correction representation.

For the purpose of further confirming the presence of a co-integrating relationship among the variables in the model, the coefficient of the lagged error correction term should be negative and significant. The reliability of the goodness of fit of the model is determined by conducting the stability tests using the CUSUM and CUSUMSQ tests Pesaran et. al,(1997).
. The diagnostic tests consist of heteroscedasticity, autocorrelation, normality and the functional form linked with the selected model.

4.5.3 Granger Causality Tests

It is important to establish causality between economic variables as unidirectional or bidirectional so that the actual way the variables relate is established. To examine the question of whether an economic variable causes each other, the Granger causality approach is usually employed.

There are several causality techniques such as Granger (1969), Engle & Granger (1987) and Johansen & Jesulious (1990) utilized by other researchers but they are not free from certain limitations. These tests are not free from errors like they involve stationarity requirements, selection of maximum lag length and they are susceptible to model specification. It is therefore essential to pre-test the unit root and co-integration while applying these tests. According to Gujarati (1995), there are shortcomings in Granger causality which include model specification problem and number of lags. The other problem is that of spurious regression, that is, the non-stationarity problem.

Sims (1980) recommended that when there is simultaneity among the regressed variables, these variables should receive the identical treatment. Therefore, there is one equation for each variable in this model. Additionally, the current period (time t) observation of each variable depends on its own lags as well as on the lags of the other variable in the model. Nevertheless, a VAR model does not permit us to make statements about causal relationships. VAR only allows interpretations about the dynamic relationship between the indicated variables. Therefore, after a VAR modeling, this study goes further to test for the Granger causality for the causal relationship between two variables. To test for the causal relationship between two variables the standard Granger test as it is stipulated by Granger (1969) has been employed in causality relationship literatures. Granger et al. (1969) stipulates that, if past values of a variable Y significantly contribute to forecast value of another variable, Xt+1, then Y is said to Granger cause X, the opposite is also true. The test is centered on the following VAR regressions:

$$LNRGDP_t = \alpha_1 \sum_{i=1}^{n} \beta_t \, LNRGDP_{t-i} + \sum_{j=1}^{m} \gamma_t LNEDU_{t-j} + \varepsilon_{1t} \quad (5)$$

$$LNEDU_t = \alpha_2 \sum_{i=1}^{n} \delta_t \, LNEDU_{t-1} + \sum_{i=1}^{n} \sigma_t LNRGDP_{t-j} + \varepsilon_{2t} \quad (6)$$

Where αi, βi, γj, σi, ∂j are coefficients while LNRGDPt and LNEDUt are the log transformed variables to be tested (real GDP and education), and ε_{1t} and ε_{2t} are mutually uncorrelated white noise errors, and t denotes the time period, while n and m are numbers of lags. In this model we can have the following cases:

From equation (6) the null hypothesis is that variable LNRGDP does not Granger cause variable LNEDU, which is the case if the coefficients of LNRGDP are all equal to zero, i.e γj = 0 for all j. In equation (5) the null hypothesis is LNEDU does not Granger cause LNRGDP if σj = 0 for all j. In both cases the alternative hypothesis is that at least some of the j's are not equal to zero ($\gamma j \neq 0$ and $\partial j \neq 0$ for at least some j's). If the coefficient γj's are statistically significant, then we reject Ho and conclude that education Granger causes real GDP If the coefficients ∂j's are statistically significant, then we reject the null that economic growth does not Granger cause education. However, if both γj and ∂j are statistically significant then causality runs both ways, and if γj and ∂j are both not significant then there is no causality relationship between the two variable. In most cases the empirical studies examining the causality between two or more time series variables are either based on the traditional Granger et al. (1969) causality test or on the Toda and Yamamoto Granger causality test.

4.5 Summary

The purpose of this chapter was to discuss the research methodology of the study and describe the sample time frame, describe the units of measurements, and describes the procedures of the model involved.

The ARDL model was explained in detail and the necessary tests that were conducted in the study were explained, including the Granger causality tests the autocorrelation and stability tests

CHAPTER FIVE: DATA AND EMPIRICAL RESULTS

5.1 Data

This chapter employs the model specified in the preceding chapter on the data described using the chosen time series analysis techniques. The results are presented logically in an attempt to answer what is the impact of education on economic growth. Its worth mentioning the history of the Namibian economy in order to grasp the source of data. Namibia which was formely known as South West Africa, was considered as a province of South Africa up until the 1980s (Hosten, Edwards, Boston and Church, 1997). Therefore the separate data on education, GFCF and GDP is available from 1980. This chapter presents the analysis of the variables, the unit root results and the ARDL bounds test. The results of the Granger causality are also presented.

5.2. Stationarity test results

Augmented Dickey-Fuller the Phillips-Perron (PP) tests of a unit root is used to test the stationarity of both variables. Table 3 shows the results for the test of stationarity for the all variables.

The unit root tests of the variables incorporated in the model were conducted, even though the bounds approach does not certainly necessitate the pre-testing of variables for the presence of unit roots. The Bounds test requires that none of the series be integrated of an order higher than one in order to avert the problem of spurious regression.

Table 2 : Unit root tests: ADF and PP in levels and first difference

Variable	Model Specification	ADF	PP	ADF	PP	Order of Integration
		Levels	Levels	First Difference	First Difference	
LNRGDP	Intercept	-4.234**	-4.126**	-8.218**	-12.564**	1(0)
	Intercept and Trend	-4.386**	-4.201**	-8.287**	-19.850**	1(0)
LNGFCF	Intercept	-5.686**	-5.686**	-7.112**	-17.001**	1(0)
	Intercept and Trend	-5.628**	-5.568**	-7.075**	-16.579**	1(0)
LNEDU	Intercept	-2.828*	-3.191*	-6.538**	-6.724**	1(1)
	Intercept and Trend	-3.331*	-3.389*	-6.739**	-6.920**	1(1)

Source: author's compilation and values obtained from Eviews
Notes:(a) and ** means the rejection of the null hypothesis at 10% and 5% respectively*

Table 2 shows the results of unit of stationarity for the natural log RGDP, GFCF and EDU.

The study rejected the null hypothesis at levels for RGDP and GFCF indicating that the variables are stationary and integrated of order zero, 1(0). On the other hand, the ADF and PP unit root tests results indicate that at levels, the null hypothesis for unit root for EDU cannot be rejected showing that they are non-stationary at levels. Since the study failed to reject the null hypothesis at the level form for the mentioned variable, a further test for stationarity tests at 1st difference level was done.

The study successfully rejects the null hypothesis of non- stationarity and accepts the alternate that EDU is stationary at first difference level. The mentioned variable is integrated of order one, that is 1(1).

The order of integration of lnEdu is of I(1) according to ADF and PP unit root tests, respectively. On the other hand lnRGDP is I(0) according to ADF and PP unit root tests and the order of integration for lnGFCF is I(0). Since none of the variables is of order I(2) according to all criteria, the study, therefore , examine their co-integrating relationship using Autoregressive distributed lag (ARDL) bounds model to test both the short-run and long-run relationships.

5.3 ARDL Bounds Tests for Co-integration

In order to empirically analyse the long-run relationship and short-run dynamic interactions among RGDP, GFCF and EDU, the study employed the Autoregressive distributed lag (ARDL) co-integration technique of Pesaran et al. (2001).

TABLE 3: Lag selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-27.54728	NA	0.001211	1.796899	1.931578	1.842828
1	16.98350	78.58373*	0.000150*	-0.293147*	0.245568*	-0.109430*
2	22.62048	8.952848	0.000186	-0.095322	0.847430	0.226183
3	25.78839	4.472353	0.000271	0.247741	1.594530	0.707035

. * 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 compilation

This study seeks for evidence of co-integration when an appropriate lag selection criterion is employed using the ARDL model. Akaike Information Criteria (AIC) and Schwarz information Criteria (SC) are used to determine the optimal lag length. The optimal model is the one with the smallest value (most negative value) of the AIC or SC. From Table 3 it is evident that the optimal lag length is 1. After establishing the appropriate lag length the next step is to estimate the ARDL model.

With the ARDL, the error correction term estimates the speed of adjustment to equilibrium in a cointegrating relationship. It shows how much of the disequilibrium is being corrected, that is, the extent to which any disequilibrium in the previous period is being adjusted in current point. A positive coefficient indicates a divergence, while a negative coefficient indicates convergence.

TABLE 5: ARDL Error Correction Regression

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEDU)	16.70995	11.71468	1.426411	0.1641
D(LNGFCF)	-0.201178	0.112849	-1.782720	0.0848
CointEq(-1)*	-0.840727	0.167306	-5.025090	0.0000
*Note: p-values and any subsequent tests do not account for model selection.				
F-Bounds Test Null Hypothesis: No levels relationship				
Test Statistic	Value	Signif.	1(0)	I(1)
F-statistic	5.738985	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

SOURCE: Author's compilation

The error correction term is included among the regressors and is denoted as CointEq. The coefficient associated with this regressor is the speed of adjustment to equilibrium in every period. If variables are cointegrated, it is expected that this coefficient be negative and highly significant. The table also includes the bounds test below the regression output which is not different from the bounds test in the Long -Run Form and Bounds Test table 6 below. Bounds Test reflected in table 5 above denotes the statistic associated with the CointEq regressor. Since the distribution of this test is non-standard, the value provided in the regression output is not compatible with this distribution and any inference must be conducted using the Bounds test critical values.

In this study the short-run results of the ARDL model are reflected in table 5. C(1) and C(2) are the short-run coefficients. The results indicate that, the value of coinEq(-1) is statistically significant since its probability value is less than 5 per cent. It's coefficient is less than 1 and negative (-0.840727) and indicates that, there is high speed of adjustment from the short-run to the long-run at an average of 84 per cent.

ARDL bound test is interpreted by two types of bounds known which are upper critical bound value I(1) and lower critical bound value I(0) (Pesaran et al,(1997), Pesaran et al. ,(2001). If the computed value of F-statistic exceeds the I(1) value then there exists a co-integration vector and hence a long-run relationship among the variables of study. On the other hand, if the F-statistic value falls in between the upper and lower critical bounds then the analysis is inconclusive. Conversely, if the F-statistic value is less than the lower critical bound then there is an existence of no co-integration vector and hence, no long-run relationship exists among the variables.

The results of this study shows that the F- statistic value is 5.738985 and is greater than the lower bound value 3.1 at 5 per cent and upper bound value 3.87 also at 5 per cent. This indicate

that there is a long-run relationship between the dependent variable, LNRGDP and the independent variable LNEDU. The next step is to perform the Long-Run Form.

TABLE 6: ARDL Long Run Form and Bounds Test

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.378373	3.231221	2.283463	0.0297
LNRGDP(-1)*	-0.840727	0.197974	-4.246652	0.0002
LNEDU(-1)	8.656924	4.548206	1.903371	0.0666
LNGFCF(-1)	-0.377063	0.231446	-1.629163	0.1137
D(LNEDU)	16.70995	15.15129	1.102873	0.2789
D(LNGFCF)	-0.201178	0.174908	-1.150192	0.2592

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEDU	10.29696	4.664702	2.207420	0.0351
LNGFCF	-0.448497	0.304408	-1.473342	0.1511
C	8.776186	3.287933	2.669211	0.0122

F-Bounds Test **Null Hypothesis: No levels relationship**

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.738985	10%	2.63	3.35
K	2	5%	3.1	3.87
		2.5%	3.55	4.38
		1%	4.13	5

The long-run results indicate that the probability value of 0.0351 for LNEDU is statistically significant since it less than 5 per cent unlike LNGFCF with a probability value of 0.1511 and not statically significant. The coefficient value -0.448497, for LNGFCF show that it has a negative relationship with LNRGDP while LNEDU has a positive relationship with LNRGDP since it has probability value of 10.29696.

In relation to the bounds test, there exists a long-run equilibrium relationship between RGDP and the independent variable since the F- statistic value is greater than the upper and lower bounds at 5 per cent level of significance as already indicated above. This indicates that the null hypothesis that there is no equilibrating relationship.is rejected. The next step is to test the reliability of this model.

5.4 Statistical Validity of the model

To test for the validity of the model the study used the, autocorrelation, CUSUM AND CUSUM of squares, normality heteroscedasticity stability tests. The results of these tests are explained in the next sections.

TABLE 7: BREUSCH-GODFREY SERIAL CORRELATION LM TEST:

F-statistic	0.052163	Prob. F(1,29)	0.8209
Obs*R-squared	0.064638	Prob. Chi-Square(1)	0.7993

SOURCE: Author's compilation

The probability values for both the Obs*R-squared and F-statistic are greater than 5 per cent. This means that the model is free from serial correlation. Obs*R-squared. The stability of the model is tested by CUSUM and CUSUM Square test.

5.4.1 THE CUSUM stability tests

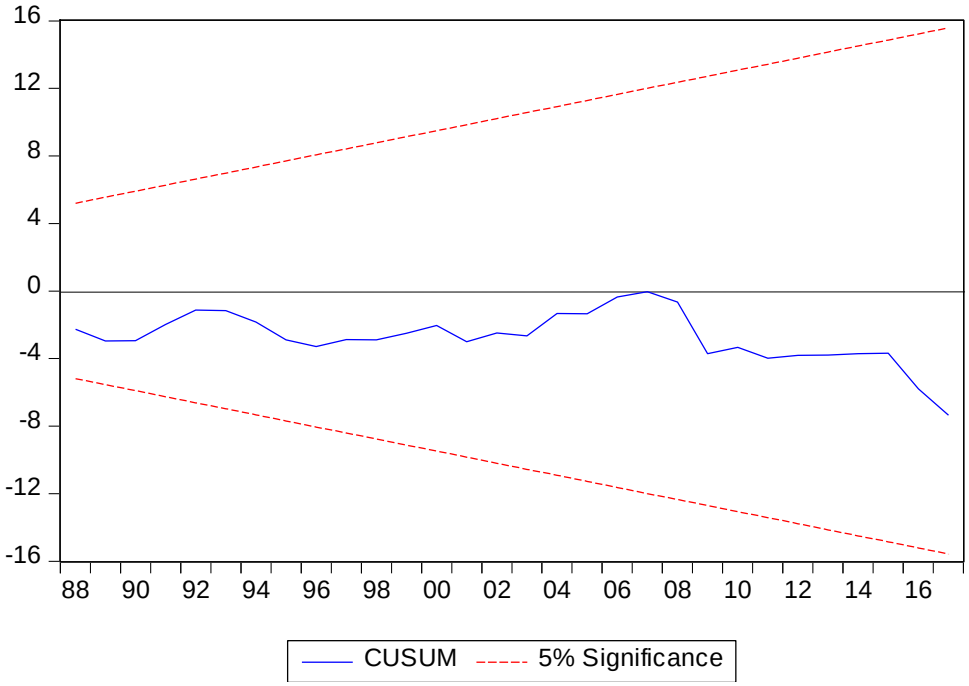

Figure 3: THE CUSUM TEST

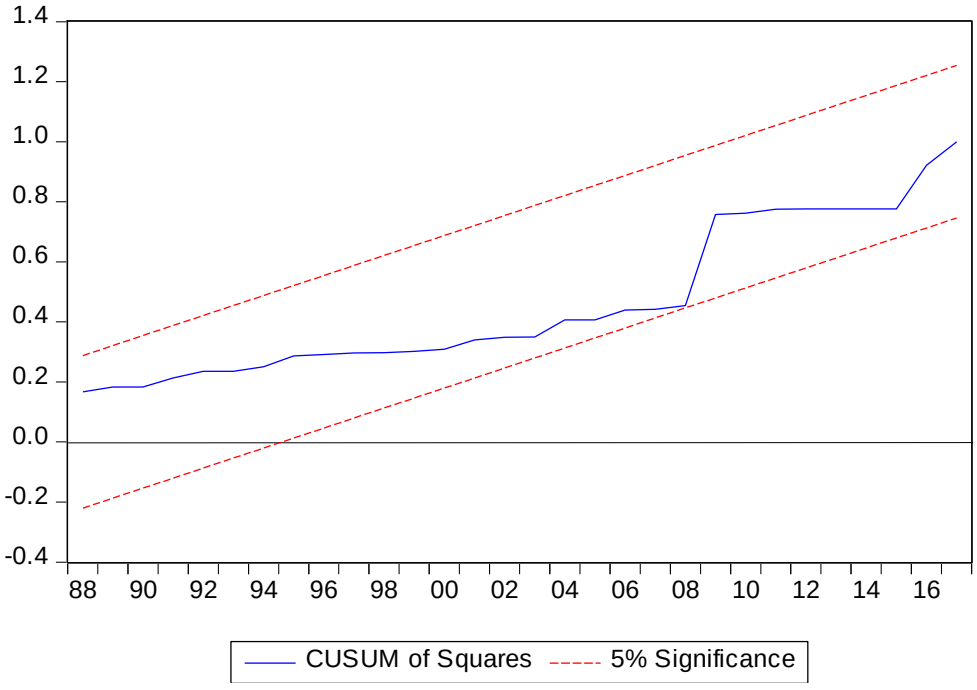

Figure 4: THE CUSUM SQUARES TEST

The stability of the model is checked through the graphs of CUSUM and CUSUM Squares tests in Figures 3 and 4. The CUSUM and CUSUM Squares tests confirm that the model is stable as the calculated lines lie inside the critical bounds at 5 per cent level of significance. If the lines cross the critical bounds, then the proposed model is unstable. The results in Figures 3 and 4 show that the lines are within the critical bounds. Therefore, the model is statistically stable, and there is no structural break in the model. This model can be used for prediction or forecasting purposes.

Following the Classical Assumption, which states that, model should be normally distributed with a mean of zero and constant variance, the study went further to test for model efficiency.

5.4.2 Normality

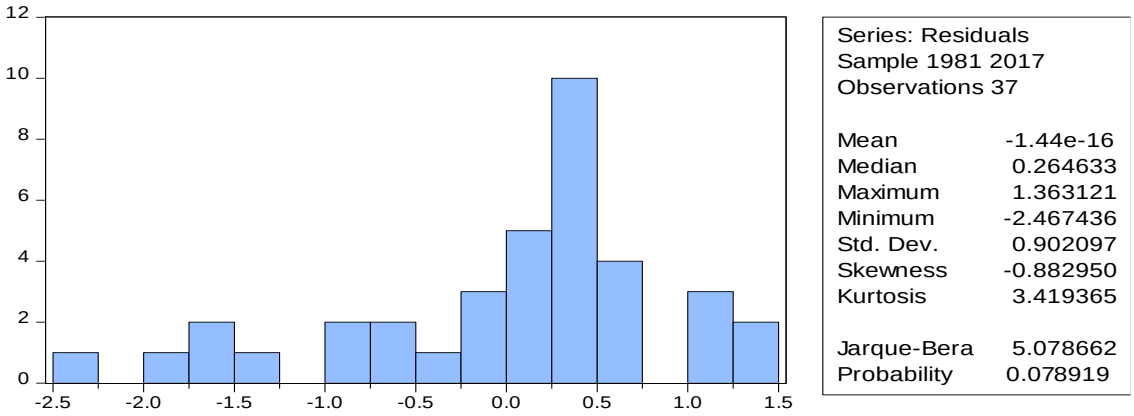

Figure 6 : Normality test: Jaque-Bera
SOURCE: Author's compilation

Figure 6 shows the Normality test which is a statistical test used to test whether the model is normally distributed with a mean of zero. The null hypothesis (H_o) indicates that residuals are normally distributed while the alternative hypothesis (H_1) shows the opposite that residuals are not normally distributed. In statistics, normality tests are used to determine whether a data set is modelled for normal distribution. Statistically, two numerical measures of shape – skewness and excess kurtosis – can be used to test for normality. If skewness is not close to zero, then your data set is not normally distributed. In this case, the skewness is closer to zero.

Therefore, the decision rule states that, the null hypothesis (H_0) should be rejected hence the estimated data is normally distributed.

5.4.3 Heteroscedasticity Test

Table 8: Heteroscedasticity Test: White

F-statistic	0.667396	Prob. F(5,31)	0.6510
Obs*R-squared	3.595779	Prob. Chi-Square(5)	0.6089

SOURCE: Author's compilation

Table 8 indicates Heteroscedasticity test which is a statistical test used to test whether the model has a constant variance. The statistical hypotheses for this test are formulated based on the statistic where the null hypothesis (H_o) shows that residuals are homoscedasticity meaning they are constant and the alternative hypothesis indicates that residuals are heteroscedasticity meaning variance are not constant (Brooks, 2014). The rejection rule state that, null hypothesis should be rejected if the probability value of observation R-square is less than 0.05 level of significance. Since the probability of Chi-Square is greater than 0.05, the test failed to reject the null hypothesis and conclude that residuals in the model are homoscedasticity, meaning they have a constant variance. Therefore, there is no problem of heteroscedasticity.

5.5 Granger causality

This part of the study used the Granger causality to test for causality among the variables. Using the pairwise Granger causality test attributed to Granger et al (1969), the following results were calculated a shown in the Table 9. It is expected that when testing for Granger causality between variables, the following possible outcomes can occur. Both variables Granger cause each other (bivariate causality) and in other cases, one variable may Granger cause the other,

in which case, there is univariate causality. The pairwise Granger causality tests for LNRGDP and LNEDU used in the study are tabulated in Table 9 below

TABLE 9. PAIRWISE GRANGER CAUSALITY TESTS

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
LNEDU does not Granger Cause LNRGDP	36	2.11060	0.1557
LNRGDP does not Granger Cause LNEDU		3.21535	0.0821

Causality can be assumed to move from one variable to the other. A test may also conclude that a variable does not Granger cause the other, when the set of coefficients on variables are not statistically significant. If X variable Granger cause Y variable but Y does not Granger cause X, the Granger causality tests concludes that, there is unidirectional causality from X to Y. On the other hand, Granger causality tests conclude that there is bidirectional causality between X and Y if X Granger cause Y and Y Granger cause X. The null hypothesis of X does not Granger cause Y is test against the alternative that X Granger cause Y.

The results in Table 9 indicate that education does not Granger cause economic growth neither does economic growth Granger cause education. Hence the study fails to reject the null hypothesis that education does not Granger cause economic growth and otherwise. The test therefore reveal no directional causality running from LNRGDP to LNEDU and from LNEDU to LNRGDP. The Granger causality results appear to be giving the results that are in contrast to what was obtained using ARDL model.

5.6 Conclusion.

The study aimed to investigate the relationship between education and economic growth in Namibia. The nature and strength of the relationship are examined in Namibia for the first time.

Unit root tests and co-integration results are discussed in the first parts of the chapter. The main focus of this empirical study remained to examine the causality and co-integration between education and economic growth in the absence and presence of gross fixed capital formation. The ARDL model analysis shows that educations has significant influence on economic growth in the long-run. On the other hand, the results of the Granger Causality test indicate that education does not Granger cause economic growth. Economic growth does not seem to affect education significantly. The study established that education, and gross fixed capital formation do not explain economic growth neither in the short-run or long-run. This results of ARDL concur with the findings of Afzal el at, (2012) who established a positive link between education and economic growth in Pakistan.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS.

6.1. Introduction

In the previous chapter, the results of the model estimation were obtained and examined accordingly. Hence, this chapter presents the summary of the study results and the conclusion.

6.2 Conclusion

The analysis shows that LNRGDP, LNGFCF and LNEDU are the three variables that were used in this study. Using ADF and PP unit root tests, the variables LNRGDP and LNGFCF were found to be stationary in levels while LNEDU was found to be non-stationary in levels but became stationary after first differencing.

The approach used for co-integration analysis was ARDL. The bounds test for cointegration was used to test whether there are long-run relationships among LNEDU, LNRGDP and LNGFCF. The results show that there is a long-run relationship between LNRGDP and .LNEDU whilst there is no long-run relationship between LNGFCF and LNRGDP.

The Jarque Bera normality, the autocorrelation, the heteroscedasticity and the CUSUM and CUSUM of squares tests were used to assess the validity of the results of the study and all these tests gave results that point to the fact that the ARDL results are valid and therefore can be relied upon. Causality is tested using Granger Causality approach. The results of Granger Causality approach indicate that there is no Granger causality between education and economic growth. Hence The test therefore reveals no directional causality running from LNRGDP to LNEDU. The findings of causal relationship between education and economic growth is in line with Ray, et al, (2013).

The evidence from the estimations support the Endogenous growth theory by Romer which is based on the notion that increases in efficiency in an economy can be tied directly to innovation

and education. In addition to that other studies like Neeliah el at. (2016) provided evidence that human capital formation was an important growth factor for the Mauritian economy over the period of 1970 to 2012. Studies in other countries like Kenya and Pakistan also showed that education has an impact on economic growth in the long-run. Therefore, bringing additional confidence to the endogenous growth theory and this is in agreement to the findings of this study according to ARDL model. An examination of the impact of education on economic growth, indicates that education in the presence of gross fixed capital formation do not have a significant influence on economic growth in the short-run and long–run, in Namibia.

6.3 Recommendations

Given the results and discussions in the previous chapter, the following are the recommendations from the research.

Increasingly huge amounts of funds have been consistently allocated to the education sector over the last few years which is beneficial and must be encouraged. It is recommended that funds must be allocated to all levels of education. Courses that are strategic in achieving economic growth should be identified and be given priority by investing more in them. The advantage of other economies lies in vocational training which emphasises practicality hence entrepreneurial activities. Entrepreneurship is the driving force behind the prosperity of developed countries hence the Namibian government is encouraged to continue investing in vocational training which may eventually be a significant positive influence on economic growth.

The government should emphasize on subsidizing education and training workers. This could be an incentive for employers to help workers in gaining human capital and hence a reward to education and consequently to economic growth.

The Namibian governmetn needs to formulate policies that encourage a labour system that rewards education. This would promote and enhance global perspective.in productivity which would lead to economic growth. The education structural reforms are essential to guarantee that skills development is improved in areas tha are critical to the economic deelopment. Therefore, the education system should focused on skill-demand to ensure that there is no disparity between damnd for skill and supply in Namibia. As a result the benefits of education will be significant in all areas of growth in Namibia.

This study is the first of this kind to be conducted in Namibia and by its findings it is recommended that further researeh be carried in this area of study. This study did not use other models such as the Johansen co-integration approach, therefore, this study entails, as work progresses, to incorporate improvements both in data and the model. There is a need to make comparison analysis with methodologies, in Namibia, such as the one mentioned above.

Further research could be conducted to find out how each level of education (pre-primary education, vocational trainings and higher education), are related to economic growth

REFERENCES LIST

Abbas, O & Peck, J.F. (2008) Human capital and economic growth: Pakistan, *The LahoreJournal of Economics,* 13(1), pp1-27

Abhijeet, C.(2010). *Does government expenditure on education promote economic growth?* New Delhi, India.

Afzal, M., Malik, M., Begum, I., Sarwar, K., & Fatima, H. (2012). Relationship among education, poverty and economic growth in Pakistan. *Journal of Elementary Education, 22*(1), pp 23-45.

Afzal, M., Rehman, H., Farroq, M., & Sarwar, K. (2011) Education and economic growth in Pakistan: A Co-integration and Causality Analysis. *International Journal of Educational Research, 50,* pp 321-335.

Aghion, P., Boustan, L., Hoxby, C. & Vandenbussche, J.(2009). The causal impact of Education on economic growth: Evidence from United States: *Brookings papers on economic activity.*

Agiomirgianakis, G.M., Asteriou, D. & Monastiriotis, V.(2002). *International Advances in Economic Research, 8(3),* pp *177–187*

Arabi, K., & Abdalla, S. (2012) The Impact of human capital on Economic Growth. *Research in World Economy Journal, 4*(2).

Ararat, O. (2007). "Role of Education in Economic Growth in the Russian Federation and Ukraine, *MPRA Paper 7590,* University Library of Munich, Germany.

Asteriou, D. & Agiomirgianakis, G. M., (2001). Human capital and economic growth: Time series evidence from Greece, *Journal of Policy Modeling, Elsevier*, 23(5), pp 481-489

Azam, M., & Ahmad, A. (2015) Role of human capital and foreign and direct investment in promoting Economic growth. *International Journal of Social Economics, 42*(2), pp98-111

Babalola, S.J. (2011). Long-run relationship between education and economic growth: Evidence from Nigeria. International Journal of Humanities and Social Science, 1(14)

.
Babatunde, M. & Adefabi A., (2005). *Long Run Relationship between Education and Economic Growth in Nigeria*: Evidence from the Johansen's Cointegration Approach.

Barro, R. J & Lee, J.W., (1996). International Measures of Schooling Years and Schooling Quality, *American Economic Review,* American Economic Association, 86(2).

Barro R. J., (2000). Inequality and Growth in a Panel of Countries. *Journal of Economic Growth*.

Barro. R. J. (1991).Economic Growth in a Cross Section of Countries. *Quarterly Journal Economics,* pp *407-444*

Barro. R. J. (1997). Determinants of Economic Growth: A Cross-Country Empirical Study, *Journal of Comparative Economics,* 26(4), pp 822-824,

Banerje, A., Dolado, J, Galbraith, J & Hendry,D. (1993). *Co-integration, Error Correction, and the Econometric Analysis of Non-Stationary Data,* Oxford University Press

Bot, E., (2014). *Endogenous growth theory*. Retrieved on 19/06/2018 from http://.equipoise-iima.com/resource/endogenous-growth theory.

Brooks, C., (2014). Introductory econometrics for finance. Cambridge University Press.
Budget statement (2015). Namibia

Chamber of Mines. (2016). Chamber of Mines input on NDP5: *Economic Structural Transformation. Chamber of Mines.* Windhoek.

Chaudhary, A. R., Asim, I. & Gillani, S. Y. M. (2009*).* The nexus between higher- education and economic growth: An empirical investigation for Pakistan. *Pakistan Journal of Commerce and Social Sciences,*

Chi, W. (2008). The role of human capital in China's economic development: Review and new evidence, *China Economic Review, 19(3),* pp *421–436.*

Danacica, D., Belaşcu, L. & Llie, L. (2010). The interactive causality between higher-education and economic growth in Romania. *International Review of Business Research Paper.* 4(6), pp 491-500

Dauda, R.O. (2010). *Role of Human Capital in Economic Development*: An Empirical Studyof Nigerian Case. Oxford: Oxford Business and Economics Conference Program.

Dickey, D., and Fuller W. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root, Econometrica, 49(4), pp 1057-1072

Dwight H. Perkins(2006), *Economics of Development*, 6th Edition, Norton, W.W.Norton & Company.

Engle, R. F. & Granger, C. W. J. (1987). *Cointegration and error correction: representation, estimation and testing.* Econometrica, 55, pp 251-276

Granger, C. W. J. (1969). *Investigating Causal Relations by Econometric Models and Cross-Spectral Methods.* Econometrica, 37, 424-438

Gujarati, D.N. (1995). *Basic Econometrics*. 3rd Ed. McGraw-Hill International Editions.New York.

Gyimah-Brempong, K., Paddison, O., and Mitiku. W. (2006). Higher education and economic growth in Africa, *Journal of Development Studies,* 42(3), pp509-529.

Hall R.E., & Jones C.H, (1999). Why Do Some Countries Produce So Much More Output Per Worker Than Others?*The Journal of Economics,* 114(1), pp. 83-116Oxford University Press.

Hanushek, E. & Kimko, D. (2000). Schooling, labour-force quality, and the growth of Nations. *The American Economic Review.* 90

Himarwa K., (2015). Ministry of Education, Arts and Culture. *The National Curriculum For Basic Education.*

Hosten, W.H., A.B., Bosman, F. & Church J. (1997). *Introduction to South African law and legal theory* .2nd . Durban: Butterworths

Huang, J.T., A.P. Kao, (2004). The Granger causality between economic growth and income inequality in post-reform China. *The International Centre for the Study of East Asian Development (ICSEAD),* Kitakyushu, Japan: pp 34-38

International Monetary Fund. (2014) *Internation Monetary Fund. Country Report, 14*(41).

Jin, G. (2008) The impact of oil price shock and exchange rate volatility on economic growth: A comparative analysis for Russia, Japan and China. *Research Journal of* international Studies, 8, pp98-111

Johansen, S. & Juselius, K.(1990). Maximum Likelihood Estimation and Inference on Cointegration with applications to the demand for Money. *Oxford Bulletin of Economics and Statistics, 52,pp 169-210.*

Katircloglu, S. (2009) Tour, trade and growth: The case of Cyprus. *Applied Economics,* 41(21)

Khorasgani, M.F. (2008) Higher education development and economic growth in Iran. Education, Business and Society: *Contemporary Middle Eastern issues,* 1(3), pp162-174.

Kim, Y. J & Terada-Hagiwara, A, (2010). A Survey on the Relationship between Education and Growth with Implications for Developing Asia, *ADB Economics Working Paper Series 236,* Asian Development Bank.

Katjavivi. P. H. (2016), *Educational Transformation In Namibia.*

Krueger,A.B., & Lindahl, M. (2000). Education for Growth: Why and Whom? *NBER Working Paper 7591*

Kaur,H., Baharom, A.M & Habibullah, M.S. 2014. Linkages between education expenditure and economic growth: Evidence from CHINDIA. *Journal of Business Management and Economics,*5(5),pp109-119.

Kilambo, H. (2015) Namibia competitiveness Ranking: Are we adressing the real issue? *National Planning Commission, 4.*

Lawal, N., & Wanab, T.(2011) Education for growth: The Nigerian experience. *Journal of Emerging Trends in Economics and Management Sciences, 2*(3), pp 225-231.

Legère, K., (1983). *Review of UNIN.* AALA 11(6):1110-1111.

Legère, K., Trewby, R & Van Graan, M (2000) Report on language policy research

Leu, C.A (1979). Opposition to Apartheid in Namibia. *Ufahamu A Journal of African Studies, 9(1)*

Liu, C., and Armer. M. (1993). Education's effect on economic growth in Taiwan, *Comparative Education Review*, 37(3), 304-321.

Lucas, E. (1988). "On the mechanics of economic development," *Journal of monetary economics*, 22, pp3-42.

Mankiw, G., Romer D., and Weil. D. (1992). A contribution to the empirics of economicgrowth, *Quarterly Journal of Economics,* 107, pp 407-437.

Mbumba, N. (2006). Education and Training Sector Improvement Programme (ETSIP), *Planning for a Learning Nation.*

McMahon W.M.,(1998*)*. Education and Growth in East Asia. *Economics of Education Review* 17(2), pp159-172

Mercan, M. & Sezer, S.(2014). *The effect of education expenditure on economic growth*. The case of Turkey. Procedia- Social and Behavioural Sciences, 109, pp925-930

Ministry of education and culture (2009). *The National Curriculum for Basic Education.*

Ministry of education and culture (2014). *Implementation of the revised curriculum for basic education.*

Magoula, T. & Prodromidis, K.P.(1999). Education and Economic Growth in Greece, *DEOS Working Papers 102,* Athens University of Economics and Business.

Mixon., J.W & Sockwell W.D (2007). The Solow Growth Model. *The Journal of Economic Education.* 38(4).pp 483

Mobolaji, H.I., (2010). Banking development, human capital and economic growth in Sub-Saharan Africa (SSA), *Journal of Economic Studies,* 37 (5), pp.557-577

Mudaki, J & Masaviru. W. (2012).Does Composition of Public Expenditure matter to Economic Growth in Kenya, *Journal of economics and sustainable development*. 13(3).

Muktadir-al-Mukit, D. (2012). Effects of Interest Rate and Exchange Rate on Volatility of Market Index at Dhaka Stock Exchange, *Journal of Business and Technology (Dhaka),* 7(2),

Musibau, A.B, and Rasak, A.A. (2005). *Long Run Relationship Between Education and Economic Growth in Nigeria:* Evidence from The Johasen's Cointegration Approach, Dakar, Senegal**.**

Namibia Statistics Agency. (2015). *National Labour Force Survey Repor*. National Statistics Agency. Windhoek

Neeliah, H. & Seetanah, B. (2016). Does human capital contribute to economic growth in Mauritius? *European Journal of Training and Development* 40(4), pp248–261.

Nelson, R., & Phelps, E. (1966) Investment in Humans, Technological Diffusion and Economic Growth. *The American Review, 56*(1).

Nnadozie. E. (2008). *African economic development.* 3rd . Bingley: Emerald Group Publishing. Oladoyin S., (2010). Investment in Education and Economic Growth in Nigeria", Empirical evidence.

Oluwatobi, S. O., and Oluranti, O.I. (2011). Government Expenditure on Human Capital Development: Implications for Economic Growth in Nigeria. *Journal of Sustainable Development,* 4(3), pp72-80.

Pencavel, J. (1991). Higher Education, Productivity, and Earnings: A Review. *Journal of Economic Education,* 22,pp 331-359.

Pereira, J., and Aubyn. M. 2009. What Level of Education Matters Most for Growth? Evidence from Portugal, *Economics of Education Review,* 28(1), pp67-73.

Peraran, M. H., & Shin,Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In S. Strom (ed.), Econometrics and Economic Theory in the 20 th Century. The Ragnar Frisch centennial symposium, Cambridge: Cambridge University Press.

Peraran, M. H., & Pesaran, B, (1997). Working with Microsoft 4.0: Interactive Econometric Analysis. Oxford: Oxford University Press.

Phillips, P. C. B. & Perron, P. (1988). *Testing for a Unit Root in Time Series Regression.* Biometrika. **75** (2), pp335–346

Phillips, P. C. B. & Ouliaris, S (1990). Asymptotic Properties of Residual Based Cointegration. Econometrica, 58,165-193.

Raja, N. (2005). Humanization of education in Pakistan through Freire's concept of literacy. *Asia Pacific Education Review,* 1(6), pp1-6.

Rambaldi, A. N., and Doran, H. E. (1996). *Testing for Granger non-causality in cointegrated systems made easy,* Working Papers in Econometrics and Applied Statistics, Department of Econometrics, The University of New England.

Ray, A. (2013). Does education spending of government really accelerate economic growth in India? *Financial and Quantitative Analysis, 1*(1), 1-7.

Reza, S. & Valeecha, S.(2012). *Impact of education on economic growth of Pakistan*. *5*(4), pp20-27.

Riesat, S., Atif, M., &Zaman, K. (2010). *Measuring the impact of educational expenditures on economic growth: evidence from Pakistan.*

Romer, P.(1990). Endogenous technological change, *Journal of Political Economy*, 98, pp71-102.

Romer, D. (2006) *Advanced Macroeconomics.* New York: McGraw- Hill.

Sachs J.D.(2005). The end of povery: *Economic possibilities for our time.* New York:Penguine Press.

Self, S., and Grabowski. R. (2004). Does education at all levels cause growth? India, a case study, *Economics of Education Review,* 23(1), 47-55.

Shaihani, M., Harris, A., Ismaila, N., and Saida. R. 2011. Long Run and Short Run Effects on Education Levels: Case in Malaysia, *International Journal of Economic Research,* 2(6), 77-87.

Shrestha, M.B., Chowdhury, K. (2005). Autoregressive distributed lag modelling approach to testing the the financial liberalisation hypothesis. University of Wollongong.

Stock, J.H., & Watson, M.W. (1988). Testing for Common Trends. *Journal of the American Statistical Association,* 83, 1035-1107

Sims.C.A.(1980). "Macroeconomics and Reality," Econometrica.48, 1-48.

SWAPO of Namibia (1989). Swapo Election *Manifesto: Towards an Independent and Democratic Namibia: Swapo's Policy Positions.*

Szirmai, A (2005), *The Dynamics of Socio-Economic Development*: An Introduction

Temple, J. (2000). Growth effects of education and social capital in the OECD countries. *Working paper* 263, Historical Social Research.

Tallman, E., and Wang. P. (1994). Human capital and endogenous growth: evidence from

Taiwan, *Journal of Monetary Economics,* 34, pp101-124.

Toda, H.Y &Yamamoto, T. (1995) Statistical inference in vector autoregressive with possible integrated processes. *Journal of Econometrics, 66, pp225-250*

Villa, S. 2005. *Determinants of growth in Italy*. A time series analysis, *Working Paper, University of Foggia, Italy.*

Wanjala M.J. & Belassi, W.(2004). The Impact of Education Expenditures on Economic Growth In Uganda: Evidence From Time Series Data. *The Journal of Developing Areas*

Zapata, H. O. and Rambaldi, A. N. (1997) Monte Carlo evidence on cointegration and causation, *Oxford Bulletin of Economics and Statistics, 59(2),* pp285-98.