POLICY INDUCED PUBLIC EXPENDITURE THRUST ON EDUCATION AND RELATED OUTCOME IN NAMIBIA AFTER INDEPENDENCE

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ABSTRACT

An attempt is made in this paper to examine whether there is a long run relationship between government spending on education and educational output in Namibia for the period 1980- 2015. The analysis reveals a long run relationship between government spending on education and tertiary enrolment rate as well as GDP. Although, no co-integration is observed between government spending on education and enrolment rate at primary and secondary level. This implies that an investment in education via an expansionary government expenditure on education may be adopted in order to realize faster economic growth and better education outcome in Namibia. However, drastic changes should be adopted to improve basic education in the country.

BACKGROUND OF THE STUDY

Education system in pre-independent Namibia was designed in line with apartheid mode by the then ruling South African government. Instead of providing the necessary human resource base to promote equitable social and economic development, education system was fragmented along racial and ethnic lines. It had vast disparities in both the allocation of resources and quality of education. After independence, the new Namibian government pledge to address this issue by creating an inclusive and unified structure for education administration. Thus, the country went through some educational reforms; particularly basic education became one of the Namibia's

top priorities. In 1990, Namibia's Education Ministry set up five goals: (1) to achieve improved and equitable access to education, (2) improvement in the quality of education, (3) enhancement of democratic participation in the education system, (4) to improve efficiency in the education system and (5) promotion of life-long learning (Zaaruka, Biwa & Kalenga, 2001).

An inclusive education system with a uniform and learner-centred curriculum for grades one through twelve was finalized in 1998 (replacing the old standard one to ten curriculum) and significant progress has been made in the use of English (replacing Afrikaans as the nation's official language) as a medium of instruction. By 2010 about 95 percent of school aged children attended school and the number of teachers has increased by almost 30 percent over 1990. More than 3000 new classrooms have been built. As a result, repetition rates in all grades have been reduced and dropout rates have also dropped significantly. In 1991, half the learners in grade 1 were repeating the grade; but in 2003, over 84 percent of learners were earning their promotions on time (Fischer, 2012).

According to Ministry of education (2015) there were approximately 1600 schools in Namibia, of which over 100 were privately owned in 2013. By the end of 2009, net primary enrolment (grade 1-7) rate had reached 98 percent from 89 percent in 1992. The Ministry of education reports that in 2007 total number of teachers was 20333, of which 894 was without teachers' training. As per qualification, 15568 teachers had more than two years of tertiary-level education, 3285 had grade 12 or 1-2 years of tertiary education, and 1,480 had less than grade 12. About 71 percent of primary school teachers and 90.3 percent of secondary school teachers were qualified. Overall student-teacher ratio was 28:1 (MOE, 2008).

Inclusive education means creating conducive learning and teaching environments for all children in

regular schools, regardless of differences in socio-economic background, (dis)ability, race, colour, sexual orientation, religion and ethnicity, among others (UNESCO, 2008). Thus, inclusive education should be seen as a process of strengthening the capacity of the education system to reach out to all learners (UNESCO, 2008). It is an overall principle that should guide all educational policies and practices, starting from the belief that education is a fundamental human right and the foundation for a more just society. However, according to UNICEF (Report: Namibia, 2015), despite having inclusive education policy in Namibia, inequality still exists. Though the country has almost achieved universal primary education, around 9 per cent of children aged between 6 and 16 years have never attended school.

Almost half of all primary school children that enrol in secondary school do not complete Grade 12, and less than 50 per cent of learners who enter Grade 1 pass their Grade 12 examinations. The situation is worse among children with disabilities or those with other special educational needs, including children from the most disadvantaged communities and minority groups such as the Himba and the San. Mobile and satellite schools have been established for Himba and San children, and there are 11 schools for children with disabilities countrywide. There is limited space in these schools and with 32,404 learners registered with disabilities; waiting lists for admission are long. Namibia has, however, integrated learners with disabilities into the public school system - they are integrated into mainstream schools as appropriate (UNICEF Namibia, 2015).

REVIEW OF LITERATURE

Relation between human capital and sustainable economic growth and development has been unfolded in

late 1950s and early 1960s (Goode, 1959; Schultz, 1961; Becker, 1962). However, it was not until the endogenous growth theory in late 1980s and early 1990s, the importance of the relationship between education and economic growth was acknowledged. The endogenous growth theory suggests that productivity can be enhanced by investing more in education and hence in human capital, which is the key component for boosting productivity and leads to higher economic growth (Lucas, 1988; Romer, 1990).

Nonetheless, early studies find mixed results on the relationship between education outputs and growth. Romer (1989) using data on 112 economies for 1960-85 and Azariadis and Drazen (1990) using data from 71 low- and middle- income countries during 1960-80 find positive association of literacy with growth. Barro (1991) shows that growth is positively related to primary and secondary enrollments and negatively associated with student–teacher ratios in 98 countries during 1960-85. However, Benhabib and Speigel (1994) observe that there is weak evidence of a relationship between changes in educational attainment of the labour force and economic growth, while Blis and Klenow (2000) argue that it was too weak to conclude that education significantly contributed to economic growth. This finding is based on their study among the 52 countries between 1960 and 1990.

Ranis, Stewart, and Ramirez (2000) find a positive relationship between literacy and growth in 79 LDCs, during 1970-92. Further, Krueger and Lindahl (2001) show that years of schooling have no growth impact in 110 countries during 1960-90 in the short run, but there is a strong positive effect in the long run. Kui (2006) finds that economic growth is determined by the primary education and represents a direct cause for higher education in China during 1978-2004. The long run relationship between economic growth and higher education in China is also

investigated by Huang et al (2009) who finds a significant long run relationship between enrolment in higher education and economic growth.

Apart from considering only the role education as determinant of human capital accumulation and growth, public education expenditure and economic growth is also noted in literature (Glomm, 1997; Das 2007; Omojimite, 2010). Levine and Renelt (1992) show that government education expenditures are not robustly correlated with growth rates. Devarajan et al (1996) finds negative correlation between education expenditure and economic growth in most of their estimates for 43 developing countries over twenty (20) years. In Nigeria, Ndiyo (2007), Nurudeen and Usman (2010) also find a negative effect of public expenditure in education on economic growth during the 1970-2000 and 1970-2008 periods. Likewise, Nketiah-Amponsah (2009) shows no public education expenditure – growth relation in Ghana during 1970–2004. Bosupeng (2015) using cointegration and causality techniques assessed the long run relationship between economic growth and education expenditure for Botswana during the period 1960-2013 and confirms absence of a long run relationship between the two variables. Contrary to that, a positive impact of educational spending on growth is shown by Krueger and Lindahl (2001).

Hong-Sang and Thorbecke (2003), using a multi-sectoral computable general equilibrium model find that education can raise economic growth and well-targeted education expenditure would be effective for poverty alleviation through better human capital and skilled labour in Tanzania and Zambia. Musila and Belassi (2004) with error correction model and cointegration suggest a positive and significant effect of government education expenditure per worker on economic growth in Uganda during 1965-1999. Also, Bose, Haque, and Osborn (2007) find significant positive impact of government expenditure on

education in 30 LDCs during 1970-90, while school enrolments inhibit growth.

Pradhan (2009) investigates causality between public educational spending and economic growth in India between 1951 and 2001 using error correction model. He found that there is a unidirectional causality from economic growth to education expenditure as suggested by Wagner's Law. Whereas Wadad and Kalakech (2009) by cointegration analysis found a positive effect of government expenditure in education on economic growth in the long term but a negative effect in the short run. Dauda (2010) also provides evidence of a positive public education expenditure – growth nexus in Nigeria for 1977-2007. Urhie (2014) also analyzes the effect of public education expenditure on educational attainment and economic growth in Nigeria from 1970 to 2010. Results reveal positive impact of educational expenditure on education but a negative effect on economic growth. Besides, there is a negative effect of education recurrent expenditure on the level of education and a significant positive effect on economic growth.

With vector error correction and cointegration analysis Owusu-Nantwi (2015) show significant positive short and long-run relationship between education expenditures and real GDP in Ghana during 1970-2012. Also by Granger causality and Error correction model, Otieno (2016) explored the effect of education expenditure per worker on economic growth in Kenya for the period 1967-2010 and find significant positive effects of education expenditure per worker on economic growth in both long term and short term.

Empirical results from the literature on relationship between government expenditure and economic growth show mixed results. Some authors find a negative relationship; others find a positive relationship while some finds no relationship at al. Thus, it is pertinent to study this

relationship in Namibia especially for the post independence period to find justification of government's effort towards education. The present study thus seeks to examine the relationship of government expenditure on education with educational outcome and economic growth in Namibia. After examining the nature of relationship, analysis is made on establishing the direction of relationship for the period 1980-2015.

METHODOLOGY AND DATA

To test for the causal relationship between two variables, standard Granger Causality test, as stipulated by Granger (1969), has been employed [see Keho (2010), Kónya (2004) among others]. Granger (1969) states that, if past values of a variable Y significantly contribute to forecast value of another variable, X_{t+1}, then Y is said to Granger cause X, the opposite is also true. Thus, the following two equations (Vector Autoregressive) can be specified

$$Y_t = \alpha + \sum_{i=1}^{m} \beta_i (Y)_{t-1} + \sum_{j=1}^{n} \tau_j (X)_{t-j} + U_t \quad \ldots\ldots\ldots\ldots (1)$$

$$X_t = \theta + \sum_{i=1}^{m} \emptyset_i (X)_{t-1} + \sum_{j=1}^{n} \gamma_j (Y)_{t-j} + \varepsilon_t \quad \ldots\ldots\ldots\ldots (2)$$

Where Y_t and X_t are the variables to be tested (like GDP, and education expenditure respectively), and U_t and ε_t are mutually uncorrelated white noise errors, and t denotes the time period in years, while *i* and *j* are number of lags.

According to Sims (1980), if there is simultaneity among variables, Vector Autoregressive (VAR) model should be employed. A VAR model suggests that if there is no much knowledge about the forces influencing a variable, then treat those variables symmetrically. If the series are not stationary then the VAR frame work need to be

modified to allow consistent estimation of the relations among the series.

$$Y_t = \beta_{10} + \beta_{11}Y_{t-1} + \beta_{12}X_{t-1} + V_t^y \quad \ldots\ldots\ldots (3)$$

$$X_t = \beta_{20} + \beta_{21}X_{t-1} + \beta_{22}Y_{t-1} + V_t^x \quad \ldots\ldots\ldots (4)$$

Where $V^y{}_t$ and $V^x{}_t$ are correlated white noise and βs are parameters to be estimated. The equations shown above are in reduced form. Y_t and X_t are the variables to be tested for their short run relationship, while Y_{t-1} and X_{t-1} are lagged values for the Y_t and X_t respectively.

Thus, a vector error correction model (VECM) can be employed for variables that are stationary in their differences (i.e., I(1)) form. VECM also take into account any co-integrating relationship among variables. From equation 1 and 2, if *X* and *Y* are stationary, the system can be estimated using the least squares applied to each equation. If *X* and *Y* are not stationary in their level form but stationary in differences (i.e., I(1)), then first differences are considered and here equation 3 and 4 are used for estimation by using least squares. If Y and X are I(1) and co-integrated, then the system equation is modified to allow for the co-integrating relation between the I(1) variables. Introducing co-integrating relation the following VECM equation set up is considered in the analysis.

$$\Delta Y_t = \beta_{11}\Delta Y_{t-1} + \beta_{12}\Delta X_{t-1} - \emptyset_1 EC_{t-i} + V_t^{\Delta Y} \ldots\ldots\ldots (5)$$

$$\Delta X_t = \beta_{21}\Delta X_{t-1} + \beta_{22}\Delta Y_{t-1} - \emptyset_1 EC_{t-i} + v_t^{\Delta X} \ldots\ldots\ldots (6)$$

Where Δ is first difference operator, βs are the coefficients in the VAR equations. $V_t^{\Delta Y}$ and $v_t^{\Delta X}$ are vector of uncorrelated disturbances. EC_{t-1} is the error correction term. The independent variables are said to cause the dependent variable if the error correction term (EC_{t-1}) is significant ($\emptyset_1$ or $\emptyset_2$ are nonzero) or the coefficients of the lagged independent variables (summation of β_{12} and β_{22}) are significant. However, if the series are not cointegrated,

Granger test is carried out without the error correction terms.

Granger (1969) further demonstrates that testing of causality is invalid if the variables order of integration is unknown. Thus, a non-stationarity (Unit root) test of the original variables should be done using Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1979; Said and Dickey, 1984), to check stationarity of variables and then further test for co-integration between the variables.

An ADF test for order of integration is given as follow: Assume that X_t is a random walk process. $X_t = X_{t-1} + \varepsilon_t$. Then the regression model becomes $X_{t-1} = \rho X_{t-1} + \varepsilon t$. Subtracting X_{t-1} from both side of the equation,

$$\Delta X_t = \pi X_{t-1} + \varepsilon_t \quad .... \quad .... \quad .... \quad (7)$$

Where $\pi = (1- \rho)$ and π is the parameter to be estimated and $X_{t,}$ denotes the respective variables of interest. Δ is the difference operator. Alternatively in case of autocorrelation in the observed series then the estimated ADF model will be

$$\Delta X_t = \pi X_{t-1} + \sum \gamma_j \Delta X_{t-i} + e_t \quad .... \quad .... \quad .... \quad (8)$$

Where, while π and γ are parameters to be estimated. If the calculated ADF statistic is less than (higher than in absolute term) the critical value, then the null hypothesis (H_0) is rejected and the series is stationary or integrated of order zero i.e., I(0).

According to Asteriou (2007), the concept of cointegration was first introduced by Granger (1981) and elaborated further by Engle and Granger (1987), Engle and Yoo (1987), Phillips and Ouliaris (1990), Stock and Watson (1988), Phillips (1986 and 1987), and Johansen (1988, and 1991). It is known that trended time series can potentially create major problems in empirical econometrics due to spurious regressions. One way of resolving this is to difference the series successively until stationarity is achieved and then use the stationary series

for regression analysis. Thus, Johansen co-integrating test requires that each of the variables be integrated of the same order. The test uses two test statistics, the trace test and the likelihood eigenvalue test. The trace statistic tests the null hypothesis that "there is at most r co-integrating relations" against the alternative of "no (m) co-integrating relations", $r = 0, 1, to, m-1$. Whereas, the maximum eigenvalue statistic test the null hypothesis that "there are r co-integrating relations" against the alternative: "there are $r+1$ co-integrating relations" (Johansen 1991). If Y_t and X_t are co-integrated, meaning $\hat{u}_t \sim I(0)$: $\hat{u}$ denotes the residuals.

The study utilise annual time series data for Namibia for the period 1980-2015, obtained from World Bank and various Ministries in Namibia. It is important to note that due to the Namibian colonial background it was difficult, if not impossible to obtain reliable and credible data for the Namibian economy for the period before 1980. The data issue is not just a Namibia issue but several authors have posited that it is almost impossible to obtain accurate data in any developing countries (Mikesell and Zinser, 1973; Gwaindepi, Musara and Dhoro, 2014). Hence the period after 1980 has been considered in this study to avoid such problem.

RESULTS AND DISCUSSION

Stationarity of all the variables is tested by Augmented Dickey Fuller test. The results failed to reject the null hypothesis of non-stationarity (unit root) at level form including intercept for all the variables. Table 1 reveals that the hypothesis of non-stationarity is rejected at first difference level for variables education expenditure, adult, elderly and youth literacy, primary and secondary net enrolment as well as secondary and tertiary gross enrolment. Thus, those variables are integrated of order one, that is I(1). Only the primary enrolment rate is

stationary at second difference. Therefore, the variables integrated of different order can be safely assumed to be not co-integrated. Table 3 also reveals that per capita education, healthcare, overall expenditure and per capita GDP are all integrated of order 1. As, majority of the variables are integrated of same order (1), we further examined their co-integrating relationship by using Johansen co-integration test.

Table 1
Test of Stationarity and Coefficient of Change in Education Expenditure and Education Related Variables

	Akaike Info Criterion						
	Level Form		**First Difference**		**Second Difference**		
	Coeff.	***τ***	***Coeff.***	***τ***	***Coeff.***	***τ***	***Remark***
P/C GDP	0.061	1.7274	-0.560	-3.530			I(1)
P/C Health Expenditure	-0.016	-1.213	-1.137	-3.249			I(1)
Adult Literacy Rate	-0.052	-1.433	-0.496	-3.266			I(1)
Elderly Literacy Rate	-0.011	-0.3441	-0.9646	-4.402			I(1)
Youth Literacy Rate	-0.03	-0.9857	-0.533	-3.4127			I(1)
Primary Enrolment Rate (G)	***-0.105***	***-1.273***	***-0.722***	***-1.6022***	***-2.125***	***-7.425***	***I(2)***
Secondary Enrolment Rate (G)	-0.041	-1.617	-0.555	-3.521			I(1)
Tertiary Enrolment Rate (G)	-0.016	-0.693	-0.869	-4.927			I(1)
Primary Enrolment Rate (N)	-0.107	-2.867	-0.565	-6.172			I(1)
Secondary Enrolment Rate (N)	-0.035	-2.182	-1.053	-3.876			I(1)
Critical Value at	1% = -3.689, 5% = -2.971		1% = -3.639, 5% = -2.951		1% = -3.646, 5% = -2.954		

Note: * indicates that the coefficient is significant at 1% level of significance, while ** indicates that the coefficient is significant at 5% level of significant. Here G represents gross and N represents net enrolment.

Tests for Co-integration

The Johansen Co-integration test is used to examine if there existence a long run relationship between the variables. Before performing the Johansen co-integration tests, we have chosen the optimum lag length. There are different criteria for the selection of optimal lag. One of the

criteria is by using Akaike information criterion (AIC). According to the AIC standard we have to choose the model with the lowest AIC value. The lower the value of AIC, the better is the model. The other way of choosing optimal lag is by using the system equation lag length criteria. In this study, we used both AIC and the system equation lag optimal length criteria. The series optimum lags length ranged from 1 to 6 (Table 2).

Table 2: Optimal lag Selection for Co-integration between Education Expenditure and Education Output Variables

Series Name	***Lowest AIC lag***	***System equations***
LNEdu_Exp & LNAdult_Lit_Rate	2	2
LNEdu_Exp & LNElderly t_Lit_Rate	3	3
LNEdu_Exp & LNYouth_Lit_Rate	5	2/5
LNEdu_Exp & LNPrimary_Net_Enrol	1	1
LNEdu_Exp & LNSec_Gross_Enrol	3	3
LNEdu_Exp & LNSec_Net_Enrol	1	1
LNEdu_Exp & LNTertiary_Gross_Enrol	4	1
LN_PC_GDP LN_PC_EDU_EXP	1	1

Both trace statistics and Max-eigenvalue test indicates the existence of maximum 2 co-integrating equations at 0.05 level between education expenditure and adult literacy rate. However one co-integrating relation is obtained in case of education expenditure and elderly literacy rate and between education expenditure and youth literacy rate. Though the test reveals two co-integrating relation of education expenditure with primary net enrolment rate and one equation with tertiary gross enrolment rate, there is no co-integrating relation between education expenditure and gross as well as net secondary enrolment ratio (Table 3). Also, both the Trace statistic and Max-eigen value test indicate presence of 1 co-integrating equation between per capita GDP and education expenditure at the 0.05 level of significance.

Table 3
Results of Co-integration Test Results

Co-integration Test between Education Expenditure and Adult Literacy Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	27.159	17.131
	(0.005)	(0.032)
$r = 1$	10.028	10.028
	(0.034)	(0.034)
Co-integration Test between Education Expenditure and Elderly Literacy Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	18.105	17.358
	(0.020)	(0.016)
$r = 1$	0.747	0.747
	(0.388)	(0.388)
Co-integration Test between Education Expenditure and Youth Literacy rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	25.075	24.789
	(0.001)	(0.001)
$r = 1$	0.286	0.286
	(0.593)	(0.593)
Co-integration Test between Education Expenditure and Primary Net Enrolment Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	31.686	16.497
	(0.001)	(0.04)
$r = 1$	15.189	15.189
	(0.003)	(0.003)

Table 3, continued		
Co-integration Test between Education Expenditure and Secondary Gross Enrolment Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	4.820	4.773
	(0.828)	(0.770)
$r = 1$	0.0472	0.0472
	(0.827)	(0.827)
Co-integration Test between Education Expenditure and Secondary Net Enrolment Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	5.580	5.577
	(0.745)	(0.668)
$r = 1$	0.002	0.002
	(0.960)	(0.960)
Co-integration Test between Education Expenditure and Tertiary gross Enrolment Rate		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	26.114	18.330
	(0.007)	(0.020)
$r = 1$	7.784	7.784
	(0.090)	(0.090)
Co-integration Test between Per Capita GDP and Per Capita Education Expenditure		
Null hypothesis	$^{J}trace$	^{J}max
$r = 0$	32.852	21.707
	(0.001)	(0.005)
$r = 1$	8.884	8.884
	(0.020)	(0.020)
Note: p-value is in the parentheses.		

Vector Error Correction Model

Since there is co-integration between the major education output variables and expenditure on education, a

vector error correction model is estimated in order to examine the short run adjustment of the target variables and the impacts of various explanatory variables on it. The normalized long-run co-integrating equation between government expenditure on education and literacy rate, enrolment rate as well as per capita GDP and education expenditure is formally presented in Box 1. To safeguard the reliability of the results, we limit the number of variable in a single VAR to a maximum 4 most relevant variables only.

The coefficients of GDP on eldary and adult literacy rate are found to be not significant (Box 1). This implies that GDP has no long run significant impact on eldary and adult literacy rate. The results in equations 1-5, further, revealed that there is a positive and significant long run relationship between government spending on education and educational development measures (literacy rate and enrolment rate and primary and tertiary level). Also, per capita GDP is found to have significant long run relationship with the educational outcome, Furthermore, the result revealed that government spending on education as well as the rate of literacy have positive and significant long run influence on the growth of economy.

Box 1:
Education Expenditure

Literacy rate - Adult

LnLR-A (-1) = 0.0449LnEExp (-1) - 0.138Ln_Pc_GDP (-1) + 3.444 … … … 1
[6.9082] [-1.99568]

Literacy rate - Elderly

LnLR-E (-1) = 0.158LnEExp (-1) + 0.409 Ln_Pc_GDP (-1) + 0.4859 … … … 2
[4.1593] [1.5879]

Literacy rate - Youth

LnLR-Y (-1) = 0.448LnEExp (-1) + 0.167 Ln_Pc_GDP (-1) + 3.5256 … … … 3
[3.994] [-1.76545]

Primary Net Enrolment Rate

LnSER_PN(-1) = 0.026LnEExp(-1) + 0.025Ln_Pc_GDP (-1) + 3.842 … … … 4
[9.7427] [8.0722]

Tertiary Gross Enrolment Rate

LnSER_TG (-1) = 0.573LnEExp (-1) + 0.143Ln_Pc_GDP + 10.485 … … … 5
[22.425] [1.78698]

Per Capita GDP and Expenditure

Ln_Pc_GDP(-1) = 0.331Ln_Pc_EduX(-1) + 0.127 LnSER_TG (-1) + 0.779 LnLR + 7.918 ... 6
[4.1868] [2.3824] [-2.6913]

Note: t-statistics are in [ ].
Ln_Eduxp = log of government education expenditure, LnLR = log of literacy rate, LnLR-A, E and Y = log of literacy (Adult, Elderly and Youth), LnSER_PN = log of primary net school enrolment rate, LnSER_TG = log of tertiary school gross enrolment rate, Ln_Pc_GDP = per capita GDP.

The estimated coefficient on the co-integration regression residual EC_{t-1}, is negative as it should be for most of the variables (Table 4). Nonetheless, the EC_{t-1} for primary net enrolment rate and elderly literacy rate were found to be not significant implying that there is no short run relationship between government educational

expenditure and net primary enrolment rate as well as elderly literacy rate. Thus, there is sufficient evidence to show that in the short-run, government expenditure on education do not have much influence on primary net enrolment and eldary literence rates. Further, the EC_{t-1} for goverment exediture on education also found to be not significant implying that there is no significant short run adjustment of GDP for arrieving at the equilibrium long run relation between GDP and government expenditure on education. Thus, goverment investiment in education has no influence on economic growth in the short-run.

Table 4
Vector Error Correction Models

Vector Error Correction Model: Education Expenditure and Per Capita GDP							
ECT_1 Edu. Exp.	-0.259 [-3.041]	-0.658 [-4.155]	-0.900 [-3.764]	-0.139 [-4.100]	-0504 [-2.635]	**ECT_1 P/ C. GDP**	-0.05306 [-3.536]
Variable	Literacy rate (Adult)	Literacy rate (Elderly)	Literacy rate (Youth)	N. Primary Enrol. Rate	G.Tertiary Enrol. Rate	**Variable**	Edu. Exp.
ECT_1	-1.273 [-2.016]	-0.396 [-0.721]	-4.584 [-1.582]	0.173 [0.546]	-0.33121 [-1.604]	**ECT_1**	0.156 [0.254]
Note: t-statistics are in the parentheses							

Granger Causality Test

The long run relationship between education expenditure, GDP and education outcome is established, which helps in developing human resources. The development of human resource may lead to the growth of GDP and on the other hand GDP growth may be the source of growing education expenditure. Hence the causality between such expenditures and GDP in per capita form has examined through Granger Causality test. Table 5 shows that the null hypothesis of government expenditure on education does not Granger cause economic growth is rejected at 5% level of significance. However, the study fails to reject the null hypothesis that per capita GDP does

not Granger cause government expenditures on education. The test reveals a significant unidirectional causality running from government expenditure on education to per capita GDP. It further revealed that there is a unidirectional causality running from enrolment at all levels (primary, secondary and tertiary) to GDP and also from literacy rate at all level (elderly, adult and youth) to GDP. The test also reveals a unidirectional causal relation of government education expenditure with literacy rate at all levels. However, there is no causal relationship between government expenditure on education and net primary school enrolment rate as well as between government expenditure on education and net secondary school enrolment rate. Further, no causal relationship between government education expenditure and gross secondary school enrolment rate, but government education expenditure significantly causes tertiary school enrolment rate.

Table 5
Granger Causality test Statistics

Null Hypothesis:	F-Statistic	Prob.
LNEE does not Granger Cause LNSE_TG	3.42784	0.0461
LNSE_TG does not Granger Cause LNEE	1.55903	0.2275
LN_PC_GDP does not Granger Cause LNSE_TG	1.12145	0.3395
LNSE_TG does not Granger Cause LN_PC_GDP	4.25519	0.024
LNEE does not Granger Cause LNSE_SN	0.07892	0.9243
LNSE_SN does not Granger Cause LNEE	0.07278	0.93
LN_PC_GDP does not Granger Cause LNSE_SN	2.51294	0.0985
LNSE_SN does not Granger Cause LN_PC_GDP	7.67157	0.0021
LNEE does not Granger Cause LNSE_SG	0.97324	0.3899
LNSE_SG does not Granger Cause LNEE	0.26104	0.772
LN_PC_GDP does not Granger Cause LNSE_SG	0.19284	0.8257
LNSE_SG does not Granger Cause LN_PC_GDP	5.24407	0.0114
LNEE does not Granger Cause LNSE_PN	1.96958	0.1577
LNSE_PN does not Granger Cause LNEE	0.20273	0.8176
LN_PC_GDP does not Granger Cause LNSE_PN	0.67546	0.5168
LNSE_PN does not Granger Cause LN_PC_GDP	4.90777	0.0146
LNEE does not Granger Cause LNLR_Y	3.28342	0.0518
LNLR_Y does not Granger Cause LNEE	1.34232	0.277
LN_PC_GDP does not Granger Cause LNLR_Y	0.22921	0.7966
LNLR_Y does not Granger Cause LN_PC_GDP	4.19243	0.0252
LNLR_A does not Granger Cause LNLR_E	0.51918	0.6004
LNLR_E does not Granger Cause LNLR_A	2.87414	0.0727
LNEE does not Granger Cause LNLR_E	6.55766	0.0045
LNLR_E does not Granger Cause LNEE	1.03519	0.3679
LN_PC_GDP does not Granger Cause LNLR_E	0.82317	0.449
LNLR_E does not Granger Cause LN_PC_GDP	4.95917	0.014
LNEE does not Granger Cause LNLR_A	5.67989	0.0083
LNLR_A does not Granger Cause LNEE	0.35748	0.7025
LN_PC_GDP does not Granger Cause LNLR_A	1.87052	0.1722
LNLR_A does not Granger Cause LN_PC_GDP	4.14401	0.0261
LN_PC_GDP does not Granger Cause LNEE	0.23386	0.793
LNEE does not Granger Cause LN_PC_GDP	5.70665	0.0081

CONCLUSION AND RECOMMENDATIONS

In this paper, attempt is made to examine if there is a long run relationship between government spending on education and educational output like literacy rate, school enrolment rate and then examined the long run relationship between government spending on education and GDP in Namibia using a dataset for the period 1980 and 2015. We observed a mixed outcome. The analysis reveals a long run relationship between government spending on education and literacy rate at all level (youth, adult and elderly). Whereas, no co-integration between government spending on education and gross enrolment rate at primary and secondary level is observed. On the other hand, the analysis shows a long run relationship between government spending on education and net primary enrolment rate as well as gross tertiary enrolment rate. The results further indicate the existence of long run relationship between government spending on education and per capita gross domestic product (GDP) during the period.

This implies that an expansionary government expenditure policy would be adopted in order to achieve faster economic growth. However, intense measures on government spending should be put on place to grasp this growth. This finding has a clear implication for the debate on sustainability of public finances. It is often claimed that rising government spending would be a key to ensure the sustainable economic development over the long-run as it is proposed by Keynes (1936). Even though the evidences from the estimations support the Keynes' theory in some aspects, the findings suggest that there is no long run relation between government spending on education and some development indicators (like, primary and secondary school enrolment rate) in Namibia.

The fact that the economy is still in reconstruction phase after the independence and some educational

outcome started showing results only after 2000, which could explain the reasons for the above result. There is an apparent inefficiency in the use of growing expenditure due to sudden shortage of required manpower immediately after the independence. Therefore, the findings propose that the Namibian government should ensure efficiency on its expenditure to guarantee overall development in the long run. Another critical reason is the capacity of professionals (UNESCO, 2008). Therefore, teachers, principals, teacher trainers and ministry officials need to be trained to implement inclusive education effectively and promote growth.

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