Education and Economic Growth in Nepal: An ARDL Approach

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Abstract

Education increases the quality and the quantity of human capital stock. The endogenous growth theory emphasizes the role of education in the economic growth. This study investigates the relationship between education and economic growth in Nepal using time series data from 1986 to 2022 in ARDL model. This study considers GDP growth as the dependent variable and growth in gross fixed capital formation, change in total population of ages 15 to 64, growth in government expenditure on education, school enrollment in secondary level, school enrollment in tertiary level and inflation rate as independent variables. The results show the existence of a long-run relationship between gross fixed capital formation and GDP positively and significantly. The government expenditure on education, school enrollment in secondary level, and inflation have insignificant and negative relation with GDP growth. Total population and school enrollment in tertiary level have positive and insignificant relation with GDP growth. In short run, total population have dynamic effects in Nepalese economy. This study suggests that there should be more studies considering other proxies to support the unavoidable evidence of education as the backbone of any economy.

Keywords: Economic growth, Government expenditure in education, ARDL model
JEL Code: O40, H52, C32

1. INTRODUCTION

The central goal of every government and society is to achieve economic growth. The growth in gross domestic product (GDP) reflects economic growth which is closely related to economic development, standard of living, and overall well-being of the country. Romer (1990) asserted that an increase in both the quantity and the quality of human capital stocks can lead to sustained economic growth. Therefore, education stands as one of the key factors contributing to economic growth.

In accordance with classical theories, the endogenous growth theory incorporates the role of education on economic growth. Investments in education, research, and development are crucial for any country (Barro, 1991; Lucas, 1988; Romer, 1990). They have empirical evidences of a positive relationship between education and economic growth. Education not only boost the labor productivity but also increases innovations. New and advanced technologies also enhance economic growth (Hanushek & Woessmann, 2008).

Ahsan, Kwan and Sahni (2012), Kolluri, Panik and Wahab (2016), and Ghali (2018) elucidated that government has to allocate its spending on education especially for social and economic infrastructure of the country. They found a positive impact of government spending on the economic growth of the country. Hence, every government spends much of its annual budget for growth and development of human capital along with other sectors of the economy via education. The government's investment in education also emerges as a key approach to uplift marginalized and disadvantaged groups in developing countries who are often excluded from mainstream opportunities. Investing in education plays a pivotal role in improving a healthy and competitive labor force (Mincer, 1974; Becker, 1962; Gautam, 2015).

Over the past three decades, Nepal has witnessed significant progress in the education sector, with the government consistently increasing its expenditure on education in each budget. In the fiscal year 2022/23, the government allocated the highest share of its annual budget to the education sector, amounting to NPR 197.29 billion, which represents more than 12.44 percent of the total budget (MoF, 2023). However, the results of such spending do not evidently demonstrate improvement in the quality of education nor a reduction in educational disparities among different regions of Nepal, as was intended according to the country's development plans. Policymakers are facing the challenging task of identifying focal areas for the development of human capital, considered as a crucial determinant of growth. It is crucial for the government to address these issues effectively, ensuring that the increased expenditure on education translates into tangible improvements in the education sector and contributes to overall socio-economic development.

In this background, the purpose of the study is to investigate the relationship between education and economic growth in Nepal. Specifically, the goal is to examine the relationship between government expenditure on education, school enrollment at both the secondary and tertiary levels, and GDP growth in Nepal.

2. LITERATURE REVIEW

British economist Harrod and American economist Domar formally initiated the academic study of economic growth in 1940. Economic growth, often measured by Gross Domestic Product (GDP) growth, signifies the expansion of a nation's production capacity. According to Denison (1962), economic growth is defined as an increase in real GDP or GDP per capita. If economic growth is characterized as an extended period of continuous GDP growth, various factors may contribute to this growth.

Scholars like Robert Solow, Trevor Swan, Joseph Schumpeter, Paul Romer, and others have made significant contributions to understanding economic growth and the factors that drive it. The neoclassical model, pioneered by Solow (1956) and Swan (1956), stands out as a prominent theory that offers significant contributions to modern growth theory. Solow's model considers the rates of saving, population growth, and technological progress as exogenous determinants of growth.

After the introduction of endogenous growth theory by Romer (1986) and Lucas (1988), factors such as innovation, knowledge, and human capital are highly recognized as crucial determinants of economic growth. This theory incorporated human capital as an input in the production function, with models suggesting that continuous advancements in education exert a substantial impact on long-term output growth. The emphasis on investing in human capital was discovered to generate a spillover effect in the economy. Romer (1990) added another component, research and development component, which was incorporated to illustrate how invention takes place, contributing to endogenous economic growth.

Arrow's (1962) further illustrated how innovation and 'learning by doing' – self-practice and innovation – enhance work efficiency. This, in turn, reduces the effort needed to produce things, thereby boosting productivity and enhancing human skills.

In this theoretical background, we consider education as a factor influencing economic growth. By investing in human capital through education, nations empower their citizens with the skills and knowledge essential for driving innovation, productivity, and societal progress. There is a plethora of literature worldwide on government spending on education and its implications for economic growth. Nevertheless, the impact of public expenditure on education and its relationship with economic growth remains a subject of debate.

Musila and Belassi (2004) utilized time-series data from Uganda spanning 1965 to 1999 to explore the relationship between education expenditure per worker and economic

growth. The results revealed a significant and positive relationship between education expenditure per worker and economic growth, both in the long run and in the short run. The conclusion was drawn using an error correction model.

Baldwin and Borrelli (2008) explored the relationship between higher education and economic growth in the United States. Their research concluded that expenditures on higher education positively influence per capita income growth. This reinforces the idea that investing in higher education contributes significantly to economic advancement.

Njong (2010) notably demonstrated a linear relationship between education and GDP growth. Moreover, the provision of education is deemed necessary for the country's development. The study, based on cross-sectional data collected from the Cameroonian household survey, revealed that poverty reduction is achievable through improvements in experience and educational attainment.

Education has emerged as an essential factor in developing human capital and achieving economic growth in the economy. Yun and Yusoff (2015) examined the impact of education expenditure and health care expenditure on economic growth in Malaysia from 1980 to 2012 using pairwise Granger causality tests. The findings revealed unidirectional causality from GDP to government education expenditure.

Mallick and Das (2015) conducted a study to investigate the effect of education expenditure on economic growth in India from 1951 to 2012. The study employed a bi-variate VAR model, co-integration, Granger causality, and impulse response analyses. The findings revealed the existence of a long-run equilibrium between education expenditure and economic growth, demonstrating a positive and statistically significant relationship.

A study conducted in Cameroon revealed significant and positive impact of education expenditures on economic growth, both in the short run and in the long run. The research, covering the period 1980-2012, utilized a vector error correction model, incorporating variables such as private gross fixed capital formation. The study concluded by asserting that education spending is a major driving force of economic growth in Cameroon (Lionel & Oliver, 2015).

Tabar, Najafi, and Badooei (2016) investigated Wagner's law and the Keynesian hypothesis regarding government expenditure and real GDP in Iran from 1981 to 2012. Employing the ARDL model, the study revealed a positive relationship, in line with Wagner's view, indicating that government expenditure, capital stock, and the

labor force have a positive impact on real GDP. In the Keynesian model, educational expenditure was also found to have a positive long-term relationship with real GDP.

Rathanasiri (2020) revealed a positive impact of government spending on education on gross domestic product in a study conducted in Sri Lanka. Similarly, Tayo and Oliver (2015) found a similar positive impact of government spending on education on economic growth in Cameroon. Both studies utilized time-series data.

Mukhtarov, Mammadov, and Humbatova (2020) added that public investments in education contribute to accelerating the economic prosperity of any nation. Their study found a positive and statistically significant impact on economic development in the long run in Azerbaijan. The research is based on time-series data from 1995 to 2018, utilizing various co-integration methods, especially ARDLBT, DOLS, and CCR.

A study conducted in Indonesia analyzed time-series data from 1988 to 2018 using the Cobb-Douglas production function and employed the Autoregressive Distributed Lag Bound Test for data analysis. The results were comparatively different for Indonesia. Econometric tests reflected a positive relationship in the long run but a negative relationship in the short run. Additionally, gross fixed capital formation showed a positive relationship, while the labor variable exhibited a negative relationship in both short and long runs (Sunwandaru, Alghamdi & Nurwanto, 2021). A similar study conducted in Pakistan found that education impacted economic growth only in the short run, with no significant effect observed in the long run (Javed, 2021).

In the case of Nigeria, the study utilized data from 1999 to 2020, where government expenditure on education served as the public spending variable, and gross domestic product (GDP) represented the economic growth variable. Regression analysis was employed to test hypotheses in the study. The research results indicate a positive and significant effect between government expenditure on education and GDP at a 5% significance level (Okerekeoti, 2022).

In the context of Nepal, there is limited literature available; however, this study attempts to review the existing literature.

Dahal (2010) identified a causal relationship between school enrollment in higher levels and real GDP during his investigation for the period 1975-2009. However, the study also revealed that school teachers had a neutral impact on the real GDP of Nepal.

The study conducted by Nowak and Dahal (2016) in Nepal from 1995 to 2013 found that secondary and tertiary education significantly and positively enhance real GDP

per capita. They employed the Johansen Cointegration technique and OLS to fulfill their aim. However, the study found that while primary education has a positive relation with real GDP per capita, it is statistically insignificant. Dangal and Gajurel (2019) aimed to demonstrate the relationship between government financing in education and economic growth in Nepal from 1982 to 2018 using the ARDL model. They found a negative relationship between government funding in education and economic growth in both the long run and the short run.

Based on the above literature, no concrete results emerged regarding the relationship between government expenditure on education and economic growth. Some studies reported a positive relationship, while others indicated negative and neutral relationships among the variables of interest in this study. Most of the studies cover time series data with a period of nearly 30 years, while others do not. Additionally, there is a limited number of studies conducted in the Nepalese context. Therefore, this study aims to fill the gap in the research world by utilizing a time series data spanning 37 years, with the expectation of establishing a positive relationship between government expenditure on education, school enrollment, and economic growth in Nepal.

3. METHODS AND DATA

This study explores the relationship between government expenditure on education and economic growth in Nepal based on the post positivist viewpoint. Moreover, this study also captures the relation of school enrollment in both secondary and tertiary level with economic growth along with inflation. The quantitative approach is used to estimate the relationship between government expenditure on education, school enrollment in secondary level, school enrollment in tertiary level and inflation, and economic growth.

Theoretical Framework

According to the endogenous growth model developed by Lucas (1988) and Romer (1986), to analyze the impact of education expenditure on economic growth, the classical theory of production function of labor and capital has been applied.

$$Q = f(L, K, H) \quad \ldots\ldots (1)$$

Where, L and K represent the units of labor and units of capital to produce Q units of output in the economy and H represents Human stocks in the equation (1). Furthermore, education has been added in the model since education enhances human capital stocks of the economy.

In the present study, education is taken as a factor for production or growth because it plays an important role in economic growth by enhancing skills and knowledge of human capital. It should be noted that various studies have measured education quantity using various proxies. For instance, education quantity is measured by schooling enrollment ratios (Mankiw, Romer & Weil 1992; Barro, 1991; Levine & Renelt 1992), adult literacy rate (Durlauf & Johnson 1995; Romer 1990) and education spending (Baldacci et al., 2005).

The mathematical model as Hanif and Arshed (2016), Pokhrel and Khadka (2019) and Ndaombwa (2023) have been used to investigate the relationship between education and economic growth is presented as.

GDP = F (GFCF, TP, GEE, SES, SET, INF) ……………………………………………...... (3)

Where, GDP is Gross domestic product, GFCF is gross fixed capital formation, TP is total population between the ages from 15 to 64 and GEE is government expenditure on education which includes current, capital and transfer payments funded by transfers from international sources to government. GEE is for the holistic growth of education. SES is school enrollment in secondary level, SET is school enrollment in tertiary level and INF is inflation rate. The econometric model of the study is expressed as.

$GDP\_G_t = \beta_0 + \beta_1 GFCF\_G_t + \beta_2 TP\_G_t + \beta_3 GEE\_G_t + \beta_4 SES_t + \beta_5 SET_t + \beta_6 INF_t + \mu$ ……… (4)

Where, GDP_G_t is gross domestic product growth at 't' time, $GFCF\_G_t$ is gross fixed capital formation growth at 't' time, TP_G_t is total population growth at 't' time, GEE_G is government expenditure on education growth at 't' time, SES_t is school enrollment in secondary level at 't' time, SET_t is school enrollment in tertiary level at 't' time and INF_t is inflation rate at 't' time.

Data Source

The study is based on secondary data sources for a period of 37 years from 1986 to 2022. The data were extracted from reliable sources such as the World Development Indicators and Economic Surveys published by Ministry of Finance, Government of Nepal. This study considered the data reliabile and valid as both the sources are nationally and internationally authentic. The data were extracted and tabulated in Microsoft excel and later analyzed in e-views10 software. The description of variables is presented in Table 1 with the expected relationship between the dependent variable and independent variables.

Table 1: Description of the Variables

Variables	Explanation	Measurement	Source of Data	Expected Sign
GDP_G	Gross Domestic Product growth at constant price, base year 2015	Change in GDP/ Previous GDP×100%	WDI	
GFCF_G	Gross Fixed Capital Formation growth at constant price, base year 2015	Change in GFCF/ Previous GFCF×100%	WDI	+
TP_G	Total Population growth, age group of 15 to 64	Change in TP/Previous TP×100%	WDI	+
GEE_G	Growth in Government Expenditure on Education	Change in GEE/ Previous GEE×100%	MoF, GoN	+/-
SES	School enrollment in secondary Level	Enrollment in secondary level/Total enrollment in school×100%	WDI	+/-
SET	School enrollment in Tertiary Level	Enrollment in tertiary level/Total enrollment in school ×100%	WDI	+/-
INF	Inflation rate	Change in GDP deflator/Previous GDP deflator×100%	WDI	+/-

Note: Author's own calculation.

4. RESULTS AND DISCUSSION

The descriptive statistics are presented in Table 2 which provides an overview of the central tendency, spread, and shape of the distribution of the variables.

Table 2: Description Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	N
GDP_G	4.475	4.566	8.977	-2.370	2.193	-0.694	4.644	37
GFCF_G	5.578	6.873	21.414	-12.030	7.157	-0.528	3.389	37
TP_G	1.956	2.009	3.485	0.744	0.606	0.172	3.064	37
GEE_G	7.026	6.074	31.179	-11.651	9.327	0.166	3.072	37
SES	50.083	42.848	84.589	26.926	18.212	0.648	2.014	37
SET	8.585	5.661	16.148	4.099	4.319	0.419	1.449	37
INF	8.696	7.360	26.397	3.070	4.854	1.583	6.098	37

Note: Author's own calculation.

From Table 2, GDP_G has a mean 4.48, median 4.57 which are almost equal, the maximum and minimum values are 8.98 and -2.37 with the standard deviation of 2.2, negative skewness (-0.69) and low kurtosis (4.6). This suggest that GDP_G has slight left skewness with relatively heavy tails in the distribution. GFCF_G has a mean 5.58, median 6.87, the maximum and minimum values are 21.414 and -12.03 with the standard deviation of 7.16, negative skewness (0.53) and low kurtosis (3.4). It suggests that GFCF_G has slight right with relatively heavy tails in the distribution. TP_G has a mean of 1.96, median 2.01 which are almost equal, the maximum and minimum values are 3.49 and 0.74 with the standard deviation of 0.61, positive skewness (0.17) and low kurtosis (3.06). It suggests that TP_G has slight right skewness with less likely normal distribution. GEE _G has a mean of 7.03, median 6.07, the maximum and minimum values are 31.18 and -11.65 with the high standard deviation of 9.37, positive skewness (0.17) and low kurtosis (3.1). It suggests that GEE_G has slight right skewness with least likely normal distribution. SES has a mean of 50.08, median 42.85, the maximum and minimum values are 84.59 and 26.93 with the standard deviation of 18.21, positive skewness (0.65) and low kurtosis (2.0). It suggests that SES_G has slight right skewness with normal distribution. The mean. Median, maximum, minimum value of SET and INF are 8.6, 5.7, 16.15, 4.1, and 8.7, 7.3, 26.4, 3.07 with the standard deviation of 4.32 and 4.85, slightly positive skewness (0.42) and (1.58) and kurtosis (1.5), (6.1) respectively. Both are right skewness with relatively tails in the distribution. From these preliminary observations, the study required detailed analysis which are as follows.

Unit Root Test

The study followed the unit root test for finding the stationarity of the variables of the model and the result is shown in Table 3. The null hypothesis is that the variables have a unit root.

Table 3: Results of Augmented Dickey Fuller (ADF) Test

Variables	At Level			At First Difference			Remarks
	With Constant	With Constant & Trend	Without Constant & Trend	With Constant	With Constant & Trend	Without Constant & Trend	
GDP_G	-4.90*** (0.0003)	-4.92*** (0.0019)	-0.628 (0.4376)	-7.53**** (0.0000)	-7.40*** (0.0000)	-7.64*** (0.0000)	I (0)
GFCF_G	-5.94*** (0.0000)	-5.81*** (0.0002)	-3.78*** (0.0004)	-9.36*** (0.0000)	-9.21*** (0.0000)	-9.51*** (0.0000)	I (0)
TP_G	-2.0508 (0.2649)	-2.5617 (0.2989)	-0.4983 (0.4927)	-2.4611 (0.1339)	-2.4074 (0.3693)	-2.51** (0.0137)	I (1)

GEE_G	-6.42***	-6.35***	-4.58***	-5.77***	-5.67***	-9.58***	I (0)
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0003)	(0.0000)	
SES	0.8744	-1.0955	4.1124	-4.23***	-4.32***	-3.31***	I (1)
	(0.994)	(0.9159)	(1.0000)	(0.0021)	(0.0082)	(0.0016)	
SET	-0.3839	-1.5405	1.3014	-4.98***	-4.92***	-4.74***	I (1)
	(0.9015)	(0.7963)	(0.9483)	(0.0003)	(0.0018)	(0.0000)	
INF	-3.77***	-3.82**	-1.3776	-8.55***	-8.43***	-8.66***	I (0)
	(0.007)	(0.0268)	(0.1533)	(0.0000)	(0.0000)	(0.0000)	

Note: Author's own Calculation. * Significant at the 10%, ** significant at the 5% and *** significant at the 1%. Lag length based on SIC. The probability based on Mackinnon (1996) one-sided p-values.

From Table 3, it is found that the null hypothesis of the variables such as GDP_G, GFCF_G, GEE_G and INF are stationary at level where as TP_G, SES and SET are stationary at first difference. Therefore, GDP_G, GFCF_G, GEE_G and INF are I (0) variables, and TP_G, SES and SET are I (1) variables. Based on ADF test results, the ARDL model is used as econometric model for the study.

ARDL Model

For the analysis of the impact of the education sector on the GDP growth, the ARDL model is specified. To derive model AIC suggests selecting proper lag structure in the model and the specification of the ARDL model based on the maximum dependent lag is 1, maximum fixed regressors are also 1. The lag structure of each model is 1, 0, 1, 0, 0, 0 and 0 for the series of GDP_G, GFCF_G, TP_G, GEE_G, SES, SET and INF. The specification of the model is.

GDP_G = C(1)×GDP_G (-1) + C(2)×GFCF_G + C(3)×TP_G + C(4)×TP_G (-1) + C(5)×GEE_G + C(6)×SES + C(7)×SET + C(8)×INF + C(9)×INF(-1) + C(10) …… ……..… (5)

The equation (1) shows the ARDL model specification, after substituting the coefficients, the model is.

GDP_G=-0.142×GDP_G(-1)+0.163×GFCF_G-1.03×TP_G+1.75×TP_G(-1)-0.03×GEE_G - 0.02×SES + 0.09×SET - 0.02×INF + 3.322 ……...…… (6)

Bound Test

The bound test which is applied to get insight about the cointegration between variables of study which confirms the existence a long-run relationship or not. The result of bound test is presented in in Table 4.

Table 4: Bound Test for Cointegration

Test Statistic	Value	Signif.	I (0)	I (1)
F-statistic	8.632594	10%	2.218	3.314
K	6	5%	2.618	3.863
		1%	3.505	5.121

Note: Author's own calculation. H_0: no level relationship, accept H_0 if F < critical value for I (0) regressors and reject H_0 if F < critical value for I (0) regressors.

Table 4 shows the bound test for co-integration analysis for whether the long run association among the variables exists or not for the specified ARDL model of the study. The F – statistics value is 8.63259 and all corresponding lower bound critical values and upper bound critical values are smaller than the F – statistics value at 1 percent, 5 percent, and 10 percent levels of significance. Hence, the null hypothesis is rejected and states that there exists long run cointegration among the variables.

Long Run Equilibrium Model

The estimated long run coefficients of the model are presented in Table 5 whereas the long run equilibrium relationship can be presented in the equation as.

GDP_G = 2.9098 + 0.1426×GFCF_G + 0.6284×TP_G - 0.0291×GEE_G - 0.0165×SES + 0.0784×SET - 0.0186×INF ……..……..…… (6)

Table 5: Estimated Long Run Coefficients of the Model

Dependent Variable: GDP_G				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCF_G	0.143	0.056	2.559	0.016
TP_G	0.628	0.849	0.740	0.465

GEE_G	-0.029	0.038	-0.758	0.455
SES	-0.016	0.064	-0.259	0.798
SET	0.078	0.288	0.272	0.788
INF	-0.019	0.079	-0.235	0.816
C	2.910	1.732	1.680	0.105

Note: Author's own calculation.

From Table 5, it was found that GFCF_G was statistically significant at 5 % in the long run. With one unit rise in GFCF_G, GDP_G rose by 0.143. If TP_G increased by one-unit, GDP_G also increased by 0.63. Though, the variables such as TP_G, GEE_G, SES, SET, and INF are statistically insignificant, with one unit increase in GEE_G, SES, INF, and SET, GDP_G by decreases by 0.03, 0.02 and 0.02, and increases by 0.08 unit respectively.

Short Run Equilibrium of the Models

In short run, the dynamics of the variables are explained by error correction model where the speed of adjustment towards the long run equilibrium are evaluated. The error correction regression is as shown in table 6.

Table 6: Error Correction Regression

Dependent Variable: D(GDP_G)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TP_G)	-1.0304	0.94625	-1.0889	0.2858
CointEq(-1)*	-1.1416	0.12242	-9.3255	0
R-squared	0.72427	Mean dependent var		0.0291
Adjusted R-squared	0.71616	S.D. dependent var		3.40607
S.E. of regression	1.81465	Akaike info criterion		4.08362
Sum squared resid	111.961	Schwarz criterion		4.17159
Log likelihood	-71.505	Hannan-Quinn criter.		4.11432
Durbin-Watson stat	1.94254			

Note: Author's own calculation.

From Table 6, the provided output is the specification with a restricted constant and no trend. The R-squared value and adjusted R-squared value are 0.72 and 0.72 respectively. These suggest that the model explains nearly 72 percent of the variability in the

dependent variable, D(GDP_G). In short run, TP_G had statistically insignificance. The coefficient on the lagged error correction term (cointEq(-1)*) represents the speed of adjustment towards the long-run equilibrium is -1.14 with a very high level of confidence (Prob: 0.0000). A unit increase in D(TP_G) decreases 1.03 unit in D(GDP_G).

Diagnostic Test

Various diagnostic tests were used to assess the reliability of the estimated ARDL approach in the study. The study tested normality, heteroscedasticity, and serial correlation by using the Jarque-Bera normality test, the Breusch-Pagan-Godfrey heteroscedasticity test, and the Breusch-Godfrey serial correlation LM tests. The results of the test are presented in Table 7.

Table 7: Diagnostic Test for the ARDL Approach

F-Version		BP Godfrey LM-version		
	Statistics	P-value	Statistics	P-value
Normality	Jarque-Bera	0.4952	1.405634	
Heteroscedasticity	F (8,27) = 0.3969	0.9125	Chi-Square (8)	0.8757
Serial Correlation	F (1,26) = 0.1074	0.7458	Chi-Square (1)	0.7004

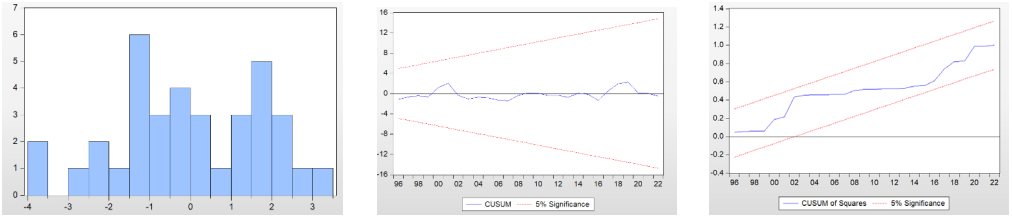
Note: Author's own calculation

From Table 7, the p-value of JB test is 0.4952(> 0.05) suggest that there is no evidence to reject the null hypothesis of normality. The F-statistic for B-P Godfrey Test is given as F (8, 27) as 0.3969 with p-value 0.9125 (> 0.05). It suggests that there is no evidence to reject the null hypothesis of heteroscedasticity. Similarly, the LM version of the Breusch-Godfrey test is given as F (1, 26) as 0.1074 with p-value 0.7458 (> 0.05). It suggests that there is no evidence to reject the null hypothesis of serial correlation. Hence, the residuals of ARDL model exhibit normality, homoscedasticity, and no serial correlation. The diagram of normality test is presented in Figure 1.

Stability Test

The long-term stability of the model is authenticated by applying CUSUM test and CUSUM square test which are presented in Figure 1. The results demonstrate that the plots of the CUSUM and CUSUM square test along the critical boundary line at 5% significance level. Both plots fall within the critical boundaries. Thus, the stability of the model has been established throughout the study period, permitting it to be employed for measuring causality and long-term relationships.

Figure 1: Normality Test, CUSUM and CUSUM Square



Note: Author's own calculation.

Discussion

Barro (1991), Lucas (1988) and Romer (1990) confirmed that education increase human productivity and ultimately enhance economic growth. Sasongko and Wibowo (2022) shown statistically significant and positive relationship between government expenditure on education and economic growth. The studies by Alrayes and Wadi (2018) and Sahoo and Sahoo (2019) for establishing the relationship between government expenditure, gross capital formation and economic growth in Bahrain and India respectively found positive and significant relation between the variables. This study also found significant and positive relation of gross fixed capital formation and GDP growth in Nepal. Therefore, this study is in accord with the theoretical aspect and other similar empirical studies. This study also found positive relation of labor force (population with ages 15 to 64) with the GDP growth as the studies of Frazis (2017), Hipple (2016), Yoo (1994) and so on. Hence, this study is also in line with the notion of the positive relationship between total population and economic growth of the economy though statistically insignificant.

As the endogenous growth theories emphasized the spending of government on education enhances economic growth, Ahsan, Kwan and Sahni (2012), Coman, Lupu and Nuta (2022), Kharel and Adhikari (2021), Shah and Bhusal (2017) and Lionel and Oliver (2015) shown positive relationship between public spending on education and economic growth. But, Chandra (2010) found negative relationship between government spending on education and economic growth in Nepal. This study also found negative but statistically insignificant relationship between them.

Dahal (2010), Njong (2010), Nowak and Dahal (2016) and other related studies found positive and significant relation between school enrollment and economic growth. However, this study found insignificant relationship between them.

The reason of such insignificant and negative relationship of education on economic growth may be because of administrative and bureaucratic system of Nepal. There may be time lagging problem and implementation problem in the government spending. Along with, the academic year begins three months before the implementation of new fiscal year. Therefore, it may invite in the allocation problem of government spending on education. In addition, this study covers the data from 1986 to 2022 which means there were so many political turbulences in Nepal during this period. For all these reasons, this study found contribution of education in the economic growth was not statistically significant.

5. CONCLUSION

The study aimed to investigate the relationship between government expenditure on education and school enrollment, and economic growth in Nepal using time series data from 1986 to 2022. This study considered growth in GDP as dependent variable and growth in GFCF, change in TP, growth in government expenditure on education, school enrollment in secondary level, school enrollment in tertiary level and inflation rate as independent variables. ARDL model was employed to estimate the relationship between chosen variables. The crux of the study was on the relationship between government expenditure on education and GDP growth in Nepal which was found statistically had a negative relationship between them but the results were not statistically significant too. Both school enrollment in secondary level and tertiary level has statistically no significant relation with GDP growth, indeed school enrollment in secondary level has negative relation and school enrollment in tertiary level has positive relation with GDP growth. In long run, gross fixed capital formation growth and total labor force growth have positive and significant relation with GDP growth. In short run, the total labor force and inflation rate have dynamic impact leading to the long-term effect on the GDP growth in Nepal. The ARDL model explicitly explain the variables at around 75 percent with the evidence of normal distribution, homoscedasticity and no serial correlation. The model was also found to be stable as was evident from CUSUM and CUSUM square test. From the results this study suggests that there should be more studies considering other proxies to support unavoidable statement of education is backbone of any economy.

6. POLICY IMPLICATION

The government of Nepal has consistently increased its expenditure in education sector in each fiscal year. Nepal has also been experiencing progressive growth. However, the results of such spending are not evidently improving both quantity and quality of education. It is a challenge to identify the focal areas for the development of human capital considered as a crucial determinant of growth. Therefore, this study would

like to suggest policy makers on the ground that mechanism of government spending on education has to be effectively mobilized and need monitoring and evaluation. In addition, the educational sector needs to be improvised with new methods of teaching and learning in Nepal.

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