



The Impact of Government's Human Capital Expenditure on Economic Growth of Nepal: An ARDL Approach

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Abstract

Background: Quality health services, education and training, play a pivotal role in expanding the productivity and income of the people. The government's expenditure on education, health and social sector is increasing rapidly in developing countries like Nepal. The increasing public spending has helped to achieve the MDGs targets and is main source to meet the SDGs targets by 2030.

Objectives: This study is engrossed in measuring the impact of the government's expenditure on education, health and social sector on the economic growth of Nepal.

Methods: The fundamental Cobb-Douglas production function is applied to measure the economic growth of the Nepalese economy. The unit root and stationarity of variables are checked through ADF, PP and KPSS. The time series econometric model of ARDL is used to explore the short-run and long-run relationship of the variables. The validity of the ARDL model is also examined to verify the authenticity of the econometric outcome.

Results: The study has anticipated that the government's education expenditure is inversely related to real GDP. In contrast, the health expenditure has shown a negative impact in the same year but a positive impact in the lagged year. Similarly, the government's social expenditure and gross capital formation have a negative effect on the same year, whereas they have exhibited significant positive impact in the lagged year. Further, in the long run, the government's education and health expenditures negatively impact (-0.7233 and -0.0055), respectively in growth.

Conclusion: The econometric results of this study explain that the government's expenditure on the education and health sector has a negative impact on economic growth, and the social sector and gross capital formation have a positive impact on the economic development of Nepal. The investment in such sectors by the public sector or the private sector is significant to increase the labour force's productivity and enhance the livelihood of the poor people. Further, it reveals that the human capital investment is a continuous process and takes a generation or more to expose the outcome in the real sense.

Keywords: Government Expenditure, Economic Growth, Health, Education, Human Capital

Paper Type: Research Paper

JEL Classification: H51, H52, H53, I15, I25

Introduction

The development focuses on increasing the quality of human beings by expanding choice, opportunity, self-esteem, freedom and equity (Todaro and Smith, 2015). The growth theories suggest that investment in health enhances economic growth through increased efficiency and productivity (Hartwig, 2010). Education and health are the key sectors for quicker improvement in the nation's capital stock. These sectors help to enlarge the efficiency and productivity of human capital. The government's social sector investment is another main way to uplift the marginalized and disadvantaged groups in society who are out of the mainstream in developing countries. The investment in education, health and social justice plays a pivotal role in developing a healthy and competitive labor force (Mincer 1958, 1974; Becker 1962; Gautam 2015). Although Nepal recorded 111th rank out of 195 countries with a score of 35.1 in the Global Security Index report, 2019 (Cameron, E. et al., 2019), Nepal has recorded remarkable attainments in the health and education sector in the last 30 years. The infant and child mortality per 1000 live births decreased from 46 to 32 and 54 to 39, respectively, in Nepal (MoHP, 2012; MoHP, 2017). Nepal has achieved outstanding results in reducing maternal mortality and infant mortality rate to meet the MDGs targets in the first decade of the 21st century. A child born in Nepal today is 49 per cent more productive if s/he has the access with choice for quality education and health services. The government's per capita health expenditure rose from \$323 to \$821 PPP from 2000 to 2017 (World Bank, 2020). Notwithstanding this improvement, affordable and equitable healthcare is still a mere dream for poor and marginalized people in Nepal (MoHP, 2015).

The government spending is ever increasing in health, education and social sector to embrace the long-term vision: "Happy Nepali, Prosperous Nepal". The government expenditure in the health sector expanded by 35% to NPR 122.77 billion in the fiscal year 2021/22. The highest share of the government's annual budget in 2021/22 is allocated to the education sector at 180.04 billion, which is more than 11% of the total budget. Similarly, the government's social sector spending has a mammoth share because of increasing social security financing for the different allowances such as old-aged, widow, differently-abled etc. (MoF, 2021).

Economic growth has mixed effects on the outcome of human capital investment (Sahnoun, 2018). The constitution of Nepal ensures access to universal health care and education for all as the fundamental rights (Constitution of Nepal, 2015). Since labor is a significant input to productivity in developing countries, health and education directly affect the efficiency and quality of the labor force because healthier people are more efficient and provide the quality and productive human capital for the nation (WHO Commission on Macroeconomics and Health, 2001).

The quality of human capital depends on the affordable and quality education, health services and level of income. Investment in education, health, and social services enables human capital capabilities. The increase in the gross domestic product helped increase the government's expenditure on education, health and the social sector. This study explores the empirical relationship and their contribution to the economic growth of Nepal. The research has the following three research hypotheses:

First

H_0 : The government's education expenditure does not increase the real GDP.

Second

H_0 : The government's health expenditure does not increase the real GDP.

Third

H_0 : The government's social service expenditure does not increase the real GDP.

The COVID-19 global pandemic has accelerated the opportunity for more significant government investment in health services. The importance of government expenditure has increased because of the COVID-19 pandemic (MoF, 2021). Although the developed countries have more outstanding and

more sophisticated health services with high-tech medical facilities than countries like ours, they are rigorously pushing the government's expenditure to upgrade the health facilities. Varieties of qualitative econometric studies are available to measure the effect of education, health and social expenditure on the economic growth of an economy.

In Nepal, the contribution of these sectors is less accounted for or studied in academia or policymaking. Human capital development highly depends on the public sector investment to enhance productivity and efficiency. The absence of empirical research to measure the impact of the Nepalese government's human capital expenditure on education, health and social services has created the pathway for this study.

The research consists of five sections. Section 1 introduces the research issue. Section 2 reviews the relevant literature on the topic I have taken up. I describe the research methodology with data sources and model specification in Section 3, and I devote Section 4 to the discussions of the results. Finally, Section 5 concludes the study's findings and outlines the future scope of further research.

Review of Literature

Human capital formation has been at the forefront of socio-economic research as the "engine of growth" (Lucas, 1988). The elasticity of education expenditure and healthcare expenditure concerning the gross domestic product (GDP) has mixed findings either elasticity higher than unity or less than unity to determine luxury or necessity (Baltagi and Moscone 2010; Lago-Peñas et al. 2013; Aslan et al. 2016). The cross-country macroeconomic studies relating to health and its consequences found that health positively affects growth. Barro (1996) showed that a 40% increase in life expectancy would increase the economic growth rate by 1.4 per cent per year. The expenditure on the social sector and health and education has a significant positive impact on achieving higher economic growth (Baldacci et al., 2008), which has stressed government interventions with an improved governance system to meet the public needs.

Further, the public spending on the health sector promotes human development and economic growth through human capital formation (WHO-ROSEA, 2017). Quality health and education services help to improve human capabilities and labor productivity. (Razmi et al., 2012). Nyamwange (2012) has posed a significant positive long-run relationship between the government's health expenditure and the GDP per capita of Kenya. Healthcare has presented as necessary goods with an elasticity of 0.024% of GDP per capita. Similarly, Uprety and Lamichhane (2016) retrieved the policy perspectives of Nepal's health budget and financing system. The government investment in the health sector for free health services has contributed to achieving the Millennium Development Goals before the stipulated period. Further, the human capital outlay had a positive influence on Nepal's economic development. Government spending, which would be the primary source of financing the quality health and education services, highly influences personal income. The income-earning determines the education and healthcare expenditures in the emerging countries (Bedir, 2016). Similarly, Sahnoun (2018) reported the positive effect of healthcare expenditure on the economic growth of Tunisia, where the public spending on human capital guarantees to speed up the economic growth.

In addition, Bhowmik (2020) reported the polynomial characteristic of India's public expenditure in the health and education sector; long-run correlation with the human development index, gross domestic product per capita, and life expectancy at birth. Human capital spending was the primary cause of India's increase in life expectancy, literacy rate, and per capita income. South Korea and Japan transformed their economy from recipient countries to donor countries within a single generation (less than 40 years). The remarkable achievement from East Asian countries was possible only through heavy investment in human capital, which paid later to transform labour-intensive and agrarian economies into capital intensive and knowledge-based economies (Marx & Soares, 2013).

Further, the high and sustainable economic growth depends on the government's human capital investment. Gautam (2009) has concluded that Nepal must achieve high and sustainable economic growth to avoid poverty and a low-level equilibrium trap. Adhikari et al. (2002) annotated the aspects of Nepal's human development and health policies. The health policies had a limited and indirect impression on the economic development of Nepal. Similarly, another finding suggested that the incidence of catastrophic health expenditure differs according to income level and education level. The public expenditure plays a crucial role in overcoming such catastrophic health expenditure burden on the poor, marginalized and disadvantaged group of the society. So, the universal health care facility must be accessible and affordable. (Ghimire et al., 2018). The community-managed local resources directly ensured the individual spending on health, education, and social services that have helped improve livelihoods and higher gross capital formation in Nepal (Gautam, 2013).

Further, Ranabhat et al. (2019) found the associated factors with Nepal's universal health coverage (UHC). The universal health care coverage can be assured through the financial protection through the government's leadership role that paves the pathway for the economic development of Nepal. Gautam (2015) reported that the forward and backward linkages of life expectancy, literacy rate and per capita income advance the quality of life and sustainable development that enlarge the economic growth in Nepal. The expenditure on human capital is not an unproductivity expense. Instead, it is a productive investment for creating a healthy life and productive human resources. Human capital expenditure has greater importance in accelerating the economic growth of Nepal.

The previous studies found that theoretically, investment in education, health and the social sector must enhance the healthy livelihood and productivity of the labor force. However, the econometric analysis has different outcomes in different countries and continents. Some studies found that the government's expenditure on health positively impacts growth, whereas the education and social sector has inconclusive or adverse effects and vice versa. Therefore, this study intends to test the impact of government expenditure in these sectors on the economic growth of Nepal.

Some economists debate the government's human capital expenditure on economic growth. They argue that education and health expenditure have adverse effects on economic growth. On the other hand, Adhikari et al. (2002) found a strong positive response to such expenditure in long-run economic development. Nepal has minimal research on the government's human capital expenditure and economic growth of Nepal. Academic research like this fills the gap on these issues and prescribes a policy intervention to emphasise the importance of public spending in education, health and social sectors.

Research Methods

Model Specifications

This study has focused on human capital is driven by economic growth. As the availability of natural resources, human resources, capital formation, technological development, and institutional factors determine the economic growth, this study has considered the government's human capital expenditure in relation to four crucial sectors: education, health, education, social and gross capital formation. The availability of factors of production determines the level of output in an economy. Therefore, the fundamental econometric model of this study is specified based on the Cobb-Duglas production function (Wulan, 2013) as:

$$Y = A (K^\alpha, L^\beta) \dots\dots\dots (1)$$

Where Y represents the total output (Gross Domestic Product), K represents the amount of capital, L represents the labor and α and β are the elasticity coefficient of K and L, respectively.

The basic microeconomic theory suggests that the increase in the amount of labor and/or capital increases the level of output, remaining technology is fixed. Similarly, capital formation in an economy

determines the level of capital. Therefore, equation (1) is augmented by the government's education expenditure [GEDU], government's health expenditure [GHE], government social expenditure [GSOE] and gross capital formation [GRCFOR].

The equation (1) is expressed as:

$$RGDP = f(GEDU, GHE, GSOE, GRCFOR) \dots (2)$$

The equation (2) is further expressed with their respective coefficients as follows:

$$RGDP_t = \alpha + \beta_1 GEDU_t + \beta_2 GHE_t + \beta_3 GSOE_t + \beta_4 GRCFOR + \mu_t \dots (3)$$

Where t is the time period and α is the constant. Similarly, $\beta_1, -\beta_4$ are the coefficients of the respective independent variables and μ_t is the error term.

The natural logarithm transformation of equation (3) is as follows:

$$\ln RGDP_t = \alpha + \beta_1 \ln GEDU_t + \beta_2 \ln GHE_t + \beta_3 \ln GSOE_t + \beta_4 \ln GRCFOR + \mu_t \dots (4)$$

Here, \ln represents the natural logarithm.

Data Sources

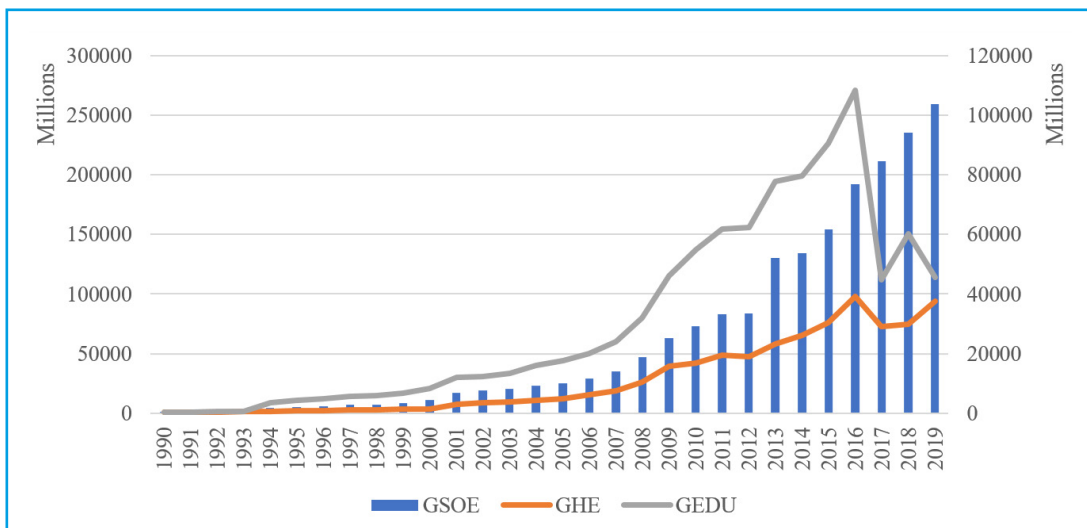
The study uses time series secondary data of 29 years (1990 to 2019). The dataset is extracted from World Bank Online Data Catalogue and verified from the Ministry of Finance and Nepal Rastra Bank publication. The real GDP (RGDP) measures economic growth as the previous studies suggested as a proxy of economic growth (Sahnoun, 2018; Khan et al., 2016; Baldacci et al., 2008).

Result and Data Analysis

Descriptive Analysis

Figure 1 records the increasing trend of government expenditure in the education, health and social sector. The amount of government expenditure is tiny till 2000. After 2001, the proportion of government expenditure on these sectors increased rapidly. Social sector expenditure has steadily increased because of the increasing burden of direct cash transfer on social security schemes to the targeted population. After 2016, the amount of education and health sector expenditure has declined because of implementation of the federal governance system and the direct transfer of bulk budget to the local and province-level governments without specifying the area of expenditure.

Figure 1: Trend of government's expenditure on education, health and social sector in Nepal



Unit root and Stationarity Analysis

The stability of the model is first tested through unit root and stationary tests using EViews 11 [Student Lite Version]. Table 1 presents the unit root and stationary test of the variables, which helped to select the appropriate econometric model (Herranz, 2017).

Table 1: Unit Root Test

Unit root test at level	Test with constant			Test with constant and trend		
Variables	ADF	PP	KPSS	ADF	PP	KPSS
LNRGDP	-0.311	-0.70	0.71	-3.08	-2.19	0.118
LNGEDU	-2.79	-3.52*	0.66	-1.35	-0.95	0.174
LNGHE	-1.41	-1.67	0.70	-1.25	-1.36	0.148
LNGSOE	-1.92	-3.79*	0.71	-2.63	-2.86	0.158
LNGRCFOR	0.67	0.89	0.69	-1.73	-1.73	0.147
Critical Value at 5%	-2.967	-2.967	0.463	-3.574	-3.57	0.146

Unit root test at first difference	Test with constant			Test with constant and trend		
Variables	ADF	PP	KPSS	ADF	PP	KPSS
LNRGDP	-4.81**	-3.31	0.14	-4.66**	-3.13	0.142
LNGEDU	-5.39**	-6.85**	0.49	-6.71**	-6.85**	0.093
LNGHE	-5.08**	-5.21**	0.27	-5.12**	-5.21**	0.125
LNGSOE	-5.69**	-7.09**	0.27	-6.08**	-7.09**	0.141
LNGRCFOR	-5.20**	-5.50**	0.18	-3.96**	-5.50**	0.066
Critical Value at 5%	-2.97	-3.58	0.463	-3.580	-3.580	0.146
Critical Value at 1%	-3.68	-4.32	0.739	-4.323	-4.323	0.216

Note: ** and * indicate significance levels at 1% and 5%, respectively.

Table 1 denotes the ADF, PP and KPSS test results for unit root and stationarity test in the given model specifications at a level and first difference degree of differentiation with the test equation at intercept. Suppose the ADF test statistics or PP test statistics is more significant than ADF or PP critical values. In that case, we should accept the null hypothesis, i.e., unit root exists, and data is non-stationary. Otherwise, it rejects the null hypothesis, i.e., unit root does not exist and data is stationary (Phillips and Parron, 1988). The variables used in the models get mixed with I(0) and I(1).

Model selection

The order of integration is calculated in the data set to select the appropriate model for estimation.

The time series model of equation (4) has a different order of integration. Therefore, the variables included in equation (4) are analyzed using a cointegration test based on the autoregressive distributed lag (ARDL) approach. This method gives the long-run and short-run coefficients of the variable's irrelevance in their integration if the variables are either I(0) or I(1). Therefore, equation (4) is modified to the ARDL version of the specification as:

$$\Delta LNRGDP_t = \alpha + \beta_1 LNRGDP_{t-1} + \beta_3 LNGEDU_t + \beta_2 LNGHE_{t-1} + \beta_4 LNGSOE_{t-1} + \beta_5 LNGRCFOR_{t-1} + \sum_{i=1}^{28} \gamma_i \Delta LNRGDP_{t-i} + \sum_{i=1}^{28} \theta_i \Delta LNGEDU_t + \sum_{i=1}^{28} \delta_i \Delta LNGHE_{t-1} + \sum_{i=1}^{28} \phi_i \Delta LNGSOE_{t-1} + \sum_{i=1}^{28} \omega_i \Delta LNGRCFOR_{t-1} + v_t \dots\dots\dots(4)$$

The equation (4) explains the dynamic effect in the form of the ARDL model, where Δ stands for the first order differential variable, α is the intercept, $\beta_1 \beta_2 \beta_3 \beta_4 \beta_5$ are the coefficients of first-order variables. Similarly, $\gamma_i, \delta_i, \theta_i, \phi_i$ and ω_i are error correction model parameters, and vt is a random error vector. After the stability test, the empirical model is tested through Microfit 5.5, freely available and one of the most reliable time series analysis software.

Test of Short run Relationship

The short run effect of the independent variables to the real GDP are as follows:

Table 2: Estimated short run coefficients using the ARDL

Dependent variable is LNRGDP			
<i>Regressor</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>T-Ratio[Prob]</i>
LNRGDP(-1)	.82218	.064912	12.6661[.000]
LNGEDU	-.012861	.0073598	-1.7475[.096]
LNGHE	.025007	.010923	2.2893[.033]
LNGHE(-1)	-.025999	.012264	-2.1200[.047]
LNGSOE	.011604	.014465	.80219[.432]
LNGSOE(-1)	.024296	.0081758	2.9718[.008]
LNGRCFOR	-.014371	.011570	-1.2420[.229]
LNGRCFOR(-1)	.040349	.010730	3.7603[.001]
INPT	3.8891	1.4805	2.6270[.016]
R-Squared	.99969	R-Bar-Squared	.99957
F-Stat. F(8,20)	8089.9[.000]	DW-statistic	2.1251
F-statistic	5.59.9	W- statistic	27.9544

The R-Squared .99969 exhibits that the given variables explain the variance in the LNRGDP by 99.97 per cent. Similarly, the DW-statistic 2.1251 is near 2, which shows no autocorrelation in the model. Further, If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect cannot be rejected. The F-statistic 5.5909 is higher than the upper bound of 4.7919 at 95%. Further, the W-statistic 27.9544 is higher than the upper bound of 23.9597 at 95%. It verifies the short-run relationship between the dependent and independent variables in the model.

The results show that a one-year lag of LNRGDP has a positive impact on LNRGDP. 1% increase in real GDP of the previous year increases the LNRDP by 0.82. Similarly, The government's education expenditure (LNGEDU) has a negative impact (-0.01286) on real GDP at a 10% significance level. Further, the health expenditure has a positive impact (0.0250) in the same year, whereas it negatively impacts the following year by -0.0259 at a 10% level of significance. Finally, the government's social sector expenditure and gross capital formation have an insignificant or negative impact in the same year. In contrast, it has a positive impact of 0.0242 and 0.0403, respectively, at a 1% significance level in the next year.

Model or Result Validation

The result of the model is validated through the autocorrelation and heteroskedasticity test. Further, a plot of the cumulative sum of recursive residuals and histogram of residuals and the normal density is used to validate the model output as below:

Test of Autocorrelation

Autocorrelation is a characteristic of data which shows the degree of similarity between the values of the same variables over successive time intervals (Gujarati et al., 2012). The regression result shows that the D-W statistic is 2.12 which is near 2; indicating that the model does not have a serial correlation. Further, the serial correlation of residuals is calculated as:

Table 3: Test of Serial Correlation of Residuals (OLS case)

The dependent variable is LNRGDP

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
OLS RES(-1)	-.17246	.25393	-.67915[.503]
Lagrange Multiplier Statistic		CHSQ(1) = .68733[.407]	
F Statistic		F(1,19) = .46125[.505]	

Table 3 shows the B-G LM test for autocorrelation. The coefficient of B-G LM test statistics (RESID (-1) = -.17246 accepts the null hypothesis i.e., there is no autocorrelation in the data series.

Test of Heteroskedasticity

The test of heteroskedasticity is computed for a range of heteroskedasticity specifications in the OLS equation's residuals. The results of the Breusch-Pagan-Godfrey for heteroskedasticity test are outlined below.

Table 4 shows the heteroscedasticity test of the Breusch-Pagan-Godfrey test. The coefficient of heteroscedasticity test that accepts the null hypothesis in model specification.

Table 4: Autoregressive Conditional Heteroscedasticity Test of Residuals (OLS Case)

The dependent variable is LNRGDP

Lagrange Multiplier Statistic	CHSQ(1) = 2.5079[.113]
F Statistic	F(1,19) = 1.7986[.196]

Stability Test

CUSUM, CUSUMQ and histogram of residuals are used to test the stability of the coefficient displayed in Figures 2, 3 and 4. The coefficient is stable because the coefficients follow the range of stability.

Figure 2: Plot of Cumulative Sum of Recursive Residuals

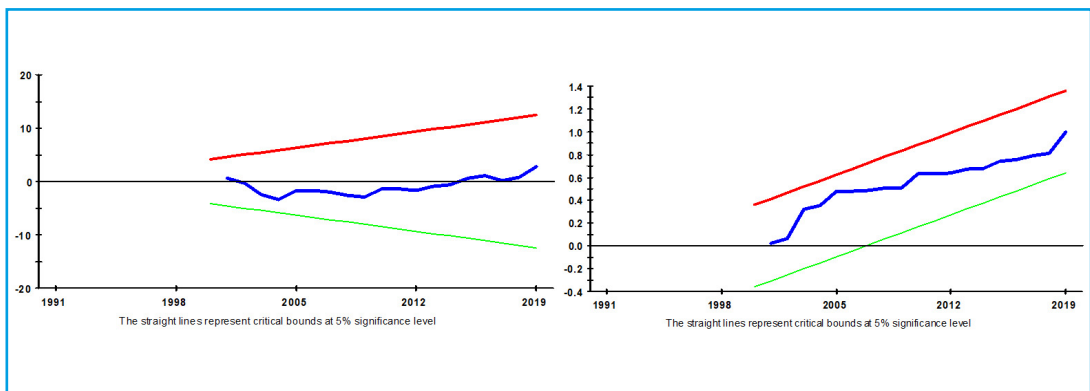
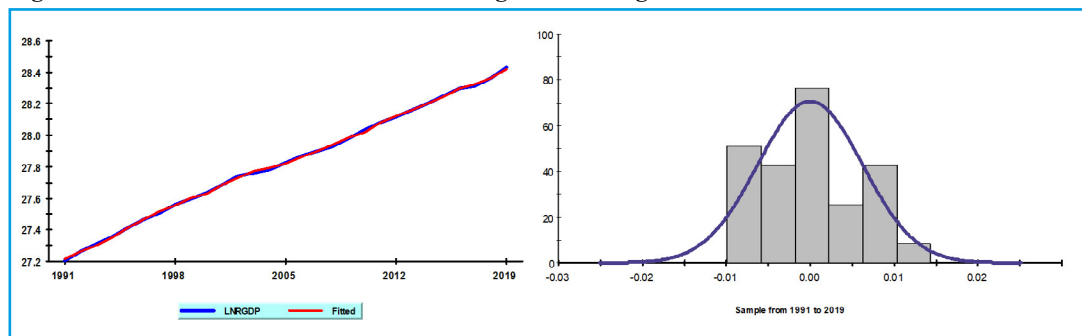


Figure 3: Plot of Actual and fitted Values **Figure 4: Histogram of Residuals and the Normal Density**

Test of long run relationship

The long relationship of the variables is estimated using the ARDL approach to explore the possibility of the long run impact of the independent variables to dependent variable LNRGDP.

Table 5: Estimated long run coefficients using the ARDL

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LNGEDU	-.072328	.028526	-2.5355[.020]
LNGHE	-.0055818	.048557	-.11495[.910]
LNGSOE	.20189	.041325	4.8855[.000]
LNGRCFOR	.14610	.063631	2.2960[.033]
INPT	21.8712	.47742	45.8109[.000]
F-statistic	5.5909	W-statistic	27.9544

The F-statistic 5.5909 is higher than the upper bound of 4.7919 at 95%. Further, the W-statistic 27.9544 is higher than the upper bound of 23.9597 at 95%. It shows the long run relationship between the dependent variable LNRGDP and independent variables in the specified model.

The long-run relationship shows fascinating results. The government's education expenditure (LNGEDU) and health expenditure (LNGHE) have a negative impact (-0.7233 and -0.0055), respectively. The LNGEDU is significant at a 5% significance level, whereas the LNGHE is insignificant. Further, the government's social sector expenditure (LNGSOE) has a positive impact (0.20189) at a 1% significance level. In contrast, the gross capital formation has a positive effect (0.14610) at a 5% significance level on real GDP (LNRGDP).

The model predicts the mixed and different results for short run and long run impacts of sectoral expenditure on the real GDP of Nepal. The results show that lagged real GDP positively impacts real GDP in the short run. Further, the government's education expenditure (LNGEDU) has a negative impact on real GDP. In contrast, the government's health expenditure has a positive effect on the same year, but it has a negative impact on the lagged year. Finally, the government's social expenditure and gross capital formation have insignificant impacts in the same year, whereas it has a significant positive impact in the lagged year. The interesting fact is the government's education expenditure has a negative impact. In contrast, the social sector expenditure and gross capital formation positively impact Nepal's economic growth in the long run.

Results of hypothesis testing

The model results indicate the mixed relationship between the dependent variable (LNRGDP) and independent variables (LNGEDU, LNGHE, LNGSOE and LNGRCFOR). The first research hypothesis is accepted in the short and long run because the government's education expenditure has been

negatively related to economic growth. Further, regarding the second hypothesis, the null hypothesis, which means the 1% increase in government's health expenditure increases economic growth by 0.025, is rejected. But the relationship is inconclusive in the long run because of insignificant results. Finally, the third hypothesis is accepted in the current year, whereas the null hypothesis is rejected in the lag year. It means the government's social service expenditure increase the economic growth of Nepal, which holds in the long run too.

Conclusion

The study concludes that there is no strong association between economic growth and government expenditure on education, health and the social sector. But, the government's social services expenditure and gross capital formation positively affect economic growth. The econometric results of this study explain that the government's expenditure on the education and health sector negatively affects economic growth, and the social sector and gross capital formation positively impact Nepal's economic growth. The investment in such sectors by the public sector or the private sector is significant to increase the labour force's productivity and enhance the livelihood of the poor people. Further, it reveals that the human capital investment is a continuous process and takes a generation or more to expose the outcome in the real sense. In the long run, the increased education, health, and social expenditure from either the public sector or the private sector enable an individual to be a healthy and competitive human resource. It promotes human development and capital formation by mainstreaming the poor, disadvantaged and marginalized groups. Therefore, this study has created ample academic space for further research to explore the diagnostic effects of such variables in human capital formation to enhance sustainable human development.

Conflict of Interest

No conflict of interest prevails in this article.

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