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Exploring the Linking between Education Investment and Economic Growth: Evidence from Study of Nepal

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Abstract

This study aims to assess the influence of government expenditure on education and gross fixed capital formation on Nepal's GDP and to analyze the significance of human capital development in driving sustainable economic growth in Nepal by examining the relationship between educational investment and economic performance during the period 1975–2021. The method of this study is using econometric model, the study employs the Ordinary Least Squares (OLS) technique to estimate a multiple regression model, evaluating the relationships among dependent and independent variables. The findings indicate a positive correlation between government spending on education and GDP; however, the regression analysis reveals that educational expenditure does not significantly impact Nepal's real GDP. A trend analysis highlights a decline in capital expenditure on education over the years, accompanied by a steady increase in recurrent spending. The study's implication underscores the critical role of government in delivering essential education services and recommends sustained and increased investment in education to enhance human capital. These findings have significant policy implications, advocating for strategic reforms in Nepal's educational financing to foster economic growth and sustainable development. This research contributes to the broader understanding of the role of education in economic progress, offering insights specifically relevant to Nepal's socio-economic context.

Keywords: government expenditure, educational investment, gross domestic product, Nepalese economy, ADF test, descriptive statistics, *JEL Classification: H_5, I_2, O_4*

Exploring the Linking between Education Investment and Economic Growth: Evidence from Study of Nepal

Education plays a pivotal role in shaping the socio-economic framework of nations by fostering human capital development, enhancing productivity, and driving innovation. Government expenditure on education is widely regarded as an investment in the future, enabling the development of a skilled workforce and facilitating economic growth. It is well-established in economic theory that education improves labor quality, boosts productivity, and encourages technological advancement, thus steering economies toward higher levels of equilibrium output (Lucas, 1988; Romer, 1990). By enhancing individuals' ability to process information and adopt advanced technologies, education catalyzes economic prosperity and social progress.

Government spending, funded through tax and non-tax revenues, is a critical driver of economic development. This spending is categorized into current expenditures, which include day-to-day operational costs, and capital expenditures, which focus on long-term investments. The allocation of resources to education is crucial for fostering economic transformation, particularly in developing countries like Nepal, where structural challenges and resource limitations often impede progress. However, poor governance, political instability, and inefficient resource allocation have historically constrained Nepal's capacity to maximize the benefits of educational investment.

The importance of education as a catalyst for economic growth and poverty reduction has been widely acknowledged. In emerging economies, investment in education is essential for enhancing labor force skills, reducing unemployment, and fostering innovation. Despite this understanding, gaps remain in the literature, particularly concerning the specific impact of public education funding on economic growth in Nepal. Most existing studies fail to distinguish between the effects of recurrent and capital expenditures on education or to

examine how public spending aligns with the requirements of a modern, knowledge-based economy.

This study seeks to address these gaps by exploring the relationship between education investment and economic growth in Nepal over the period 1975–2020. Using historical data and econometric methods, it examines the influence of public education funding on GDP and overall economic development. Furthermore, the study evaluates trends in educational expenditure, focusing on the balance between recurrent and capital spending. By doing so, it aims to provide actionable insights for policymakers to enhance the effectiveness of educational investments in driving sustainable economic growth.

This research is particularly relevant in the context of Nepal's developmental challenges, where strategic investments in education could serve as a foundation for reducing poverty, fostering innovation, and achieving long-term economic transformation. The findings contribute to the broader discourse on the role of education in economic progress, offering policy recommendations tailored to Nepal's unique socio-economic environment.

Literature Review

Education investment plays a crucial role in economic growth. Musila and Belassi (2004) found that government spending on education in Uganda significantly impacted growth both in the short and long term. Building on such insights, this study examines the impact of public education funding on Nepal's economic growth, addressing gaps in its specific socio-economic context. Maitra and Mukhopadhyay (2012) analyzed the influence of government expenditure on education in improving the GDP of twelve nations over a span of three decades. The analysis revealed a reciprocal influence of public expenditure on education and healthcare on GDP.

The Johansen cointegration experiments revealed the presence of cointegrating relationships. Permani (2009) examined the relationship between

education and economic development in East Asia, revealing a strong causal link between the two factors. Al-Yousif (2008) conducted a Granger causality test to investigate the causal relationship between educational expenditure and economic growth across six economies from 1977 to 2004, resulting in inconclusive findings. The research conducted by Devlin and Hansen (2001) established a Granger relationship between health expenditure and GDP across twenty OECD nations.

Blankenau et al. (2007) identified a positive correlation between public education expenditure and economic growth in industrialized countries, using panel data and a theoretical growth model, while Craigwell et al. (2012) found that health spending influences education expenditure but minimally affects enrollment in Caribbean nations. Similarly, Lacheheb et al. (2014) demonstrated that healthcare and education investments drive economic growth in MENA countries, though indirectly linked to capital formation, and Eggoh et al. (2015) revealed mixed effects in Africa, where public spending on education and health negatively impacted growth, but human capital indicators showed slight positive effects. This study builds on these frameworks to analyze the impact of education investment on Nepal's economic growth in its unique socio-economic context.

Khan et al. (2016) analyzed the relationship between health expenditure and economic growth in SAARC countries, finding a negative income elasticity of healthcare expenditure in both the short and long term. Yan and Yusoff (2018) examined trends in Malaysia's public education spending from 1982 to 2016, noting significant funding cuts. El-Dib et al. (2023) explored Egypt's education spending, using ARDL co-integration to find a positive long-term relationship with GDP growth, despite a negative short-term link. This study extends these findings by examining the impact of education investment on Nepal's economic growth in its specific context.

Piran et al. (2023) studied the impact of renewable energy on education, technology, and healthcare, finding a negative correlation between GDP, renewable energy, education, and healthcare spending, with climate change significantly increasing healthcare costs. Tatlah et al. (2011) highlighted the strong correlation between general education and economic success, emphasizing the role of education in lifelong well-being. Lacheheb et al. (2014) found that health and education investments drive economic growth in MENA nations, with a positive link to capital formation. Wang (2024) showed that educational equity and quality boost productivity and societal development. These studies provide a foundation for exploring the relationship between education investment and economic growth in Nepal.

Bisio and Lucchese (2023) conducted an empirical analysis using Italian National Institute of Statistics System of Statistical Registers data. Training, labor market efficiency, and the economy's ability to incorporate skilled workers cause the gap. They remarked that education boosts productivity in medium and high-tech manufacturing and less knowledge-intensive services, whereas under-education lowers productivity in tech and knowledge-intensive industries. Fardoush (2021) examined how government investment in Bangladesh improves quality of life through agricultural expansion, rural development, and education, notably school enrollments.

As per the author indicated that 1% increase in public education expenditure would increase life expectancy by 0.182%. Spending in these sectors affects productivity and poverty reduction, thus evaluating it is crucial. Mugizi (2018) explored how higher education supports Uganda Vision 2040. That study emphasized the importance of higher education in Uganda Vision 2040. Hunt (1982) examined education-economy linkages. The study shows that economic fluctuations affect children's education, impacted by power dynamics and fairness considerations of dominant groups. The study found that people become

aggressive for personal and communal goals, but their perception of power and justice vary.

Jeng et al. (2019) examined how schooling affects wealth inequality in over 50 countries using Gini coefficients. That study analysis showed that education investment reduces inequality, economic freedom affects educational attainment programs, and wealth disparity persists across nations. Dahal (2010) empirically examined the relationship between higher education averages and Nepal's real GDP. The study investigated 30 years' time series data on higher education enrollment, secondary school teacher employment, and Nepal's GDP.

Lee (2000) used CD production function and time series data to evaluate education and economic growth in Korea, showing that human capital is crucial. Abhijeet (2010) found that economic growth affects public education investment in India over the period of 1951-2009. A meta-analysis by Churchill et al.(2015) found that healthcare expenditure hinders growth whereas education expenditure boosts it. Zhang and Casagrande (1998), Barro and Sala-i-Martin (1995), and Baldacci et al. (2008) found a positive association between education spending and economic growth. A few characteristics were positively correlated, according to Easterly and Rebelo (1993).

Investment in education is widely recognized as a critical driver of economic growth. For instance, Amir (2023) emphasizes that the efficacy of investments in educational institutions significantly contributes to sustainable economic growth, particularly in Pakistan, where the infrastructure of education is a vital measure of human capital beyond mere enrollment figures. This assertion is supported by findings from (Shahzad et al., 2022), who argue that human capital, as a key driver of long-term economic growth, is influenced by various health and education indicators across developing countries (Shahzad et al., 2022). Similarly, Bachama et al. (2021) provide evidence that expenditures on health and education positively correlate with economic growth in Nigeria, reinforcing the notion that

human capital investments yield substantial economic returns (Bachama et al., 2021).

The quality of education is another critical factor influencing economic growth. Affandi et al. (2018) highlight that the quality of education impacts economic growth differentials among countries, indicating that higher enrollment rates in primary and secondary education correlate positively with subsequent economic growth (Affandi et al., 2018). This aligns with the findings of (Gao, 2024), who notes that human capital, particularly through education, enhances productivity and income levels, thereby promoting economic growth (Gao, 2024).

Furthermore, the systematic review by Benoit et al. (2022) underscores that investments in human capital not only accelerate growth but also contribute to poverty reduction and improved income distribution (Benoit et al., 2022). However, the relationship is not universally positive. Kocevska (2023) presents a contrasting view, suggesting that in North Macedonia, public expenditures on education did not significantly contribute to economic growth during the analyzed period, indicating a need for more effective allocation of educational resources to transform expenditures into productive human capital (Kocevska, 2023). This highlights the complexity of the relationship and the necessity for targeted policies that ensure educational investments translate into economic benefits.

Moreover, the interplay between human capital and other forms of capital, such as physical capital, is crucial for understanding economic growth dynamics. Research by Xingyang & Liu (2021) suggests that knowledge-based human capital significantly influences economic growth, emphasizing the importance of education in fostering innovation and productivity (Xingyang & Liu, 2021). Additionally, the study by Li (2023) discusses how mismatches in human capital can restrain economic growth, suggesting that aligning educational outcomes with labor market needs is essential for maximizing economic potential (Li, 2023).

Research Methodology

Research Design

This study applied a descriptive research methodology grounded in publicly available secondary data sources. The ADF test, cointegration bound test, VECM, and Granger causality test were utilized to analyze the data of the study. The analysis revealed both short- and long-term correlations between GDP and government expenditure on education and healthcare.

Model Formulation

Since factors besides education spending impact GDP, a controlled variable is also added to the analysis. Gross capital formation and secondary enrolment are viewed as controlled variables in this study for this reason. CEE (Capital Expenditure on Education), REE, GCF, and SEE are independent variables, whereas GDP is a dependent variable. The fundamental model is as follows:

$$GDP_t = f(CEE_t, REE_t, GCF_t, SEE_t) \quad \text{.....(i)}$$

Equation (i) can be written as the regression form below.

$$GDP_t = \propto_0 + \propto_1 CEE_t + \propto_2 REE_t + \propto_3 GCF_t + \propto_4 SEE_t + \in_t \quad \text{..... (ii)}$$

Where;

GDP = Gross Domestic Product

CEE = Capital Expenditure on Education

REE = Recurrent Expenditure on Education

GCF = Gross Capital Formation

SEE = Secondary Education Enrolment

t = Time period

To decrease heteroskedasticity, the variables must be converted to log form, and the log form of the model is to be defined as:

$$LNGDP_t = \propto_0 + \propto_1 LNCEE_t + \propto_2 LNREE_t + \propto_3 LNGCF_t + \propto_4 LNSEE_t + \in_t \ldots\ldots\ldots\ldots \text{(iii)}$$

Data Sources and Reliability

This study utilizes secondary data from reliable and established sources such as the Economic Surveys of the Ministry of Finance, the Ministry of Education, and Nepal Rastra Bank. These sources are credible as they provide official data from government institutions and financial bodies, ensuring the reliability of the data used in the analysis. The time series data spans from 1975 to 2021, covering key economic and educational variables such as GDP, Capital Expenditure on Education (CEE), Recurrent Expenditure on Education (REE), Gross Capital Formation (GCF), and Secondary Education Enrollment (SEE).

Data Extraction

The data were extracted from publicly available reports and publications from the aforementioned government agencies. These datasets provide detailed and standardized records, making them suitable for time series analysis.

Rationale for Variable Selection

The study includes controlled variables such as Gross Capital Formation (GCF) and Secondary Education Enrollment (SEE) to account for other factors influencing GDP. These variables are crucial as they capture the broader economic environment (GCF) and education access (SEE), which are likely to affect the relationship between education spending and economic growth. By including these variables, the model controls for potential confounders, ensuring a more accurate estimation of the impact of education expenditure on economic growth.

Model Diagnostics

Stationery Test: Considering that the most of time series econometric methods presuppose the stationarity of time series variables, the first step in utilizing conventional estimation and testing procedures for dynamic time series is to evaluate the stationarity characteristics of the series. The data are assumed to be integrated of order I (1) with indications of unit roots, suggesting that they need to be transformed into first differences ($\Delta y_t = y_t - y_{(t-1)}$) to attain stability. This study converts non-stationary data into stationary data.

Cointegration Test: Regarding spurious regression, the only exception occurs when two or more variables are collectively stationary while not being stationary individually; in this scenario, the series are combined. This methodology examines the relationships between non-stationary time series variables. The cointegration test evaluates the nature and strength of long-term relationships between variables. This study employs the Johansen co-integration test.

VECM: The Vector Error Correction Model (VECM) assesses dynamic adjustments among the initial disparities of variables, while the cointegration test focuses solely on long-term relationships between the level series of the variables. This is carried out to determine the nature and strength of temporal causation between the variables. A vector error correction model was developed for non-stationary series identified as cointegrated.

Granger Causality Test: The relationship between variables is examined through the Pair-Wise Granger Causality Test. X is deemed Granger causal to Y when historical values of X are able to forecast future values of Y. A fundamental method for verifying Granger causality involves regressing y on its own lagged value alongside the lagged value of x. The null hypothesis (H0) asserts that all estimated coefficients for lagged x values are equal to zero. Rejecting the null hypothesis in Granger's model signifies that x does not have an influence.

Results

The relationship between educational investment and economic growth has been extensively analysed, revealing that education serves as a crucial driver for ongoing economic development. This connection holds particular importance in Nepal, given the nation's developing economy and challenges related to human capital development. Research suggests that while investment in education holds significant promise for driving economic growth in Nepal, the nation must address fundamental challenges related to funding, accessibility, and relevance. A cohesive approach that merges educational reform with comprehensive economic initiatives is essential for achieving sustainable growth.

The time series data are employed to demonstrate the outcomes of various tests. Each variable in the ADF is subjected to the unit root test. The Granger Causality Test (GCT) is used to establish causality among existing variables, while the Johansen Co-integration Test and Vector Error Correction Models (VECM) are applied to determine both short- and long-term relationships.

Unit Root Test

To determine if the data is steady, the unit root test is applied. The unit root test, which verifies the stationary of the variables, employs the improved ADF Test.

Table 1

Result of ADF Test on Level Series

Variables	I (0)		I (1)	
	t-Stat.	P-Value	t-Stat.	P-Value
LN_GDP	-0.248	0.924	-6.719	0.000*
LN_SEE	-2.741	0.075	-5.509	0.000*
LN_CEE	-2.300	0.176	-7.008	0.000*
LN_GCF	-0.455	0.890	-7.907	0.000*
LN_REE	-1.161	0.683	-7.622	0.000*

* Significance at 1% and ** 5% level

Note. The results are from data analysis.

At a 5% significance level, the unit root analysis reveals that the null hypothesis of a unit root is: (i) accepted for all variables at the series level, while (ii) the alternative hypothesis is rejected for the first difference of the variables. All the series exhibit stationarity at I(1), signifying that they are integrated of I(1). This indicates that the variables exhibit cointegration, signifying a long-term relationship between them.

Lag Selection

Formerly conducting the cointegration test, the duration of the lags must be determined. Table 2 reveals that most criteria support picking one lag length, thus we continue testing with lag (1).

Table 2

Lag Selection

Lag.	LogL.	LR.	FPE.	AIC.	SC.	HQ.
0	-131.248	-	0.001	6.337	6.542	6.413
1	109.579	414.447	1.71e-08*	-3.701*	-2.473*	-3.248*
2	120.710	16.5677	3.43e-08	-3.056	-0.804	-2.226

3	155.168	43.273*	2.52e-08	-3.496	-0.219	-2.288
4	183.006	28.485	2.88e-08	-3.628	0.672	-2.042

** Indicates lag order criterion*

Source: *Results from data analysis.*

Result of Cointegration

Cointegration takes place when two or more data variables of the same order exhibit integration. The cointegration of GDP, CEE, REE, GCF, and SEE suggests a strong likelihood of their sustained alignment over time, indicating a long-term relationship. There may be several co-integration relationships present among cointegrated variables. The Johansen test provides the statistics and estimates for all cointegrating equations. Table 3 displays the outcomes of the Johansen joint integration test.

Table 3

Johansen Cointegration Test

Hypothesis		Trace	0.05	
Number of CE(s)	Eigenvalue	Stat.	Cric. Value	Prob.**
0*	0.632	92.084	76.973	0.002
1	0.358	47.085	54.079	0.181
2	0.236	27.133	35.193	0.282
3	0.223	15.018	20.262	0.225
4	0.078	3.678	9.164	0.462

* Rejection (0.05 level)

** p-values of MacKinnon

Rank Test of Maximum Eigen value

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigen value	Stat.	Crit. Value	Prob.**
0*	0.632	44.999	34.806	0.002
1	0.358	19.951	28.588	0.416
2	0.236	12.116	22.299	0.643
3	0.223	11.339	15.892	0.228
4	0.078	3.678	9.166	0.462

* Rejected at the 0.05 level
** There is no co-integrating at 0.05 level.

Note. Results from data analysis.

VECM (Vector Error Correction Model)

A vector error correction model is relevant because of the long-term relationship among the variables. Calculations are performed using data at this level. The model autonomously transforms the variables into the initial difference. Projections indicate that the lasting relationship may develop:

Table 4

VECM

D (LN_GDP) = C (1) *(LN_GDP (-1) - 0.6074* LN_GCF (-1) - 0.3710* LN_SEE (-1) + 0.0008* LN_GCE (-1) - 0.0789* LN_REE (-1) + 0.0692) + C (2)

*D (LN_GDP (-1)) + C (3) *D (LN_GCF (-1)) + C (4) *D (LN_SEE (-1)) + C (5) *D (LN_GCE (-1)) + C (6) *D (LN_REE (-1))

	Coeff.	**Std. Er.**	**t-Stat.**	**Prob.**
C (1)	-0.329	0.045	-7.310	0.000
C (2)	-0.168	0.116	-1.447	0.156
C (3)	0.085	0.075	1.141	0.261
C (4)	-0.197	0.092	-2.156	0.037
C (5)	-0.003	0.012	-0.254	0.801
C (6)	-0.048	0.027	-1.802	0.079
R^2	0.457	Mean dep. Var		0.122
Adj. R^2	0.387	S.D. dep. Var		0.066
S.E. of regression	0.052	AIC		-2.970
SSR	0.103	S C		-2.729
Log likelihood	72.835	HQ criter.		-2.880
DW Stat	2.018			

Note. Results from data analysis.

The Vector Error Correction Model's findings are shown in Table 4, where the R^2 value represents the variation in the descriptive variables. It shows how well the model's explanations are. The model's R-squared value of 0.457 (45.69%) shows that it is completely appropriate and devoid of spurious regression. The

VECM coefficient is strongly negative. There is proof that the independent elements and economic growth are related over the long term.

Long Run Causality

The ECM coefficient is significant at the 1% level, demonstrates the anticipated negative sign, and varies from zero to one. The importance of the error correction process suggests a long-term steady-state equilibrium between real output (GDP) and the explanatory variables, thereby reinforcing the concept of co-integration. The ECM demonstrates that the long-term elasticity of the explanatory components shows feedback of 32.97 percent from the previous year's disequilibrium. The coefficient of the error correction term reflects the speed at which changes in the explanatory variables lead real output to realign towards long-term static equilibrium. The adjustment rate may be characterized as swift thereafter.

Short run Causality

Table 5

Wald Test

Coefficient	Test Stat.	Value	df	Prob.
C (2)	Chi-square	2.095	1	0.148
C (3)	Chi-square	1.302	1	0.254
C (4)	Chi-square	4.647	1	0.031*
C (5)	Chi-square	0.064	1	0.799
C (6)	Chi-square	3.247	1	0.072

Note. Results from data analysis.

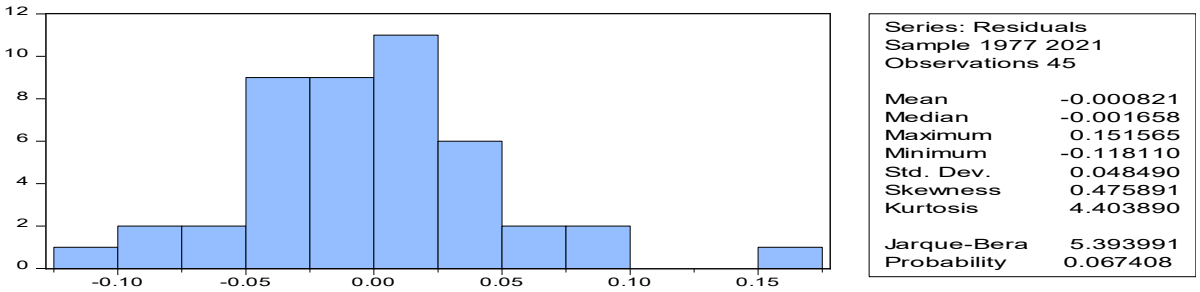
There has no evidence of short-run causation resulting from the lag of GDP, REE, gross capital formation, and CEE to GDP because the X^2 is more than 5%. However, in short-term causation connecting SEE to GDP since the probability value of X^2 is less than 5%.

Normality Test

The distribution of the model's variables is analyzed through the Jarque-Bera test for normality. This test illustrates that the variables adhere to a normal distribution. Figure 1 presents the test results.

Figure 1

Jarque-Bera Normality Test



Note. Results from data analysis

The result shows that the H0 is accepted since the probability of the test is greater than the 5% level. Because the p- value of Jarque Bera (5.394) is more than 5%, the model's residual distribution.

Residual test of Heteroskedasticity

BPG residual test is intended to detect heteroskedasticity, which is a problematic in regression analysis. The results of the test are shown in the Table 6.

Table 6

Heteroskedasticity Test

F-stat.	1.689	Prob. F (10,34)	0.124
Obs*R^2	14.938	Prob. R^2 (10)	0.134
Scaled SS	18.909	Prob. R^2 (10)	0.041

Note. Results from data analysis.

The Breusch-Pegan-Godfrey heteroskedasticity test findings are shown in Table 6. In other words, the residual is homoscedastic if the p-value of the obs. X^2

is more than 5%; otherwise, the H0 of heteroskedasticity is not rejected at the 5% level.

Serial Correlation Test

The Breusch-Godfrey LM test, which is shown in the Table 7 must be used to regulate the serial correlation.

Table 7

Breusch-Godfrey Serial Correlation LM Test

F-test	0.084	Prob. F (1,32)	0.774
Obs* X^2	0.117	Prob. C X^2 (1)	0.732

Source: *Results from data analysis.*

The results of the test, as shown in Table 7, demonstrate that the model displays autocorrelation. The null hypothesis (H0) suggests that there is no serial correlation, given that both the F-test and the observed Chi-squared probability are above 5%.

Granger Causality Test

The Granger Causality test is utilized to examine the causal relationship between dependent and independent variables. The assessment aims to pinpoint the origins of impacts, as this data is crucial for guiding policy decisions. The results of the Granger-Causality test are partially displayed in Table 8.

Table 8

Pair-wise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Prob.
LN_GCF is no Granger Causality in LN_GDP	46	14.643	0.001
LN_GDP is no Granger Causality in LN_GCF		4.906	0.032
LN_SEE is no Granger Causality in LN_GDP	46	10.999	0.002
LN_GDP is no Granger Causality in LN_SEE		0.832	0.367
LN_CEE is no Granger Causality in LN_GDP	46	4.332	0.043
LN_GDP is no Granger Causality in LN_CEE		1.369	0.248
LN_REE is no Granger Causality in LN_GDP	46	0.184	0.670
LN_GDP is no Granger Causality in LN_REE		0.723	0.400
LN_SEE is no Granger Causality in LN_GCF	46	4.518	0.039
LN_GCF is no Granger Causality in LN_SEE		1.115	0.297

Null Hypothesis	Obs	F-Statistic	Prob.
LN_CEE is no Granger Causality in LN_GCF	46	0.296	0.589
LN_GCF is no Granger Causality in LN_CEE		1.354	0.251
LN_REE is no Granger Causality in LN_GCF	46	0.98	0.001
LN_GCF is no Granger Causality in LN_REE		0.481	0.492
LN_CEE is no Granger Causality in LN_SEE	46	0.482	0.481
LN_SEE is no Granger Causality in LN_CEE		0.575	0.451
LN_REE is no Granger Causality in LN_SEE	46	3.091	0.086
LN_SEE is no Granger Causality in LN_REE		0.546	0.464
LN_REE is no Granger Causality in LN_CEE	46	1.363	0.249
LN_CEE is no Granger Causality in LN_REE		7.770	0.008

Note. Results from data analysis.

Table 8 presents the Granger-Causality of the model concerning the independent and dependent variables. The Granger Causality test evaluates the causal relationship between independent and dependent variables. The aim of the test is to categorize the sources of inspiration, as this is crucial for guiding policy decisions. The results demonstrate a bidirectional causal relationship between LN_GCF and LN_GDP. There is no causal relationship identified from LN_SEE to LN_REE, from LN_CEE to LN_SEE and LN_REE, or from LN_SEE to LN_GCF. A unidirectional causal relationship is present from LN_SEE and LN_REE to LN_GDP, as well as from LN_CEE to LN_REE.

Discussion

The findings of the study align closely with the existing literature on the relationship between education investment and economic growth, while also offering new insights specific to Nepal's context. The study emphasizes the critical role of education, particularly secondary education expenditure (SEE), in driving economic growth. This mirrors findings in the literature, such as those by Musila and Belassi (2004) and Maitra and Mukhopadhyay (2012), who found that public education spending significantly impacts GDP in both the short and long term. The study's conclusion that SEES has a pronounced influence on Nepal's economic output reinforces the idea that education is a key driver of development,

especially in developing economies like Nepal, where human capital development is crucial.

The study also reveals the importance of gross capital formation (GCF) and its bidirectional relationship with GDP. This finding is consistent with previous research, such as Lacheheb et al. (2014), which highlights the mutually reinforcing relationship between capital formation and economic growth. The study suggests that fostering a stable economic environment to attract and optimize capital investments can further stimulate economic growth, a perspective shared by the broader literature. Furthermore, the study's finding that SEE has an immediate impact on GDP while the effects of higher education expenditures (CEE and REE) take time to manifest adds a nuanced understanding to the debate. This matches with the literature, such as Permani (2009) and El-Dib et al. (2023), which point out that education expenditures contribute to long-term growth, although their short-term effects may be less immediate.

One of the study's significant contributions is its analysis using the Granger causality test, which identifies unidirectional causality from SEE and REE to GDP, while no causality is found from CEE to GDP. This observation aligns with similar studies, such as Al-Yousif (2008) and Kocevska (2023), which highlight mixed or inconclusive results regarding the relationship between higher education expenditures and GDP. The lack of causality from CEE to GDP in Nepal suggests inefficiencies in the allocation of higher education resources, underscoring the need for more effective policies aimed at optimizing higher education spending.

The quality of education and its impact on economic growth is another area where the study aligns with existing research. For instance, studies by Affandi et al. (2018) and Gao (2024) emphasize the importance of educational quality in influencing economic outcomes. The study's emphasis on aligning education systems with labor market demands supports these findings, suggesting

that improving the quality of education can enhance workforce productivity and contribute to long-term economic growth.

The study discusses corroborate much of the existing literature, particularly regarding the importance of education and capital formation for economic development. However, the study offers new insights specific to Nepal, such as the delayed economic benefits of higher education expenditures and the need to optimize resource allocation. These findings highlight the complex relationship between education, capital formation, and economic growth, offering valuable implications for policymakers in Nepal and beyond.

Conclusions and Implications

This study examines how education investment affects Nepal's GDP. Human capital development is vital to economic growth and productivity. Economic growth is linked to human capital development through education. The study found that while government spending on education in the Nepalese scenario had a negligible impact on the country's GDP, labour force and gross fixed capital creation had a significant impact on economic growth. There had a negligible impact on current economic development because the ratio of recurring to capital spending in the education sector is rising. Therefore, the study shows that government spending on education in Nepal is not a significant factor in what causes economic growth.

The relationship between educational investment and economic growth in Nepal shows how education drives sustainable development. The empirical analysis found that investing in education, particularly high-quality basic and secondary education, improves human capital, productivity, and economic performance. However, many barriers prevent education from completely promoting economic progress. Unequal access, limited finance, and systemic inefficiencies are impediments. Policymakers must emphasize inclusive

educational reforms, improve public-private partnership, and optimize resource use to address these issues.

Nepal can capitalize on its demographic dividend and achieve sustainable economic growth by creating a robust educational environment. More research and longitudinal studies are needed to understand the causal relationship and improve policy in this important area. Stakeholder interviews show that while education is vital to development, resource allocation inefficiencies and a mismatch between educational outputs and job market needs undermine its effectiveness.

Regional differences show that rural areas receive less investment, limiting economic growth in certain places. Even when education rises, underemployment remains high, showing that the economy is not successfully integrating qualified workers. Quality versus quantity: Despite enrollment growth, outmoded curricula and poor teacher preparation raise concerns about education quality and outcomes. Educational attainment and labor market demands differ, highlighting the need for government reform. Curriculum changes, vocational training, and business-academic partnerships can improve educational performance and economic possibilities.

Educational budgets must be distributed well. Inefficient public budgeting and unfair allocation worsen problems. Educational investment and economic growth in Nepal are strongly linked, but structural and policy reforms are needed to strengthen this relationship. Addressing inequities, enhancing quality, and connecting education with economic demands are necessary to use education to support sustainable economic development.

References

Abhijeet, C. (2010). *Does government expenditure on education promote economic growth: An econometric analysis.* MPRA Paper 25480, University Library of Munich, Germany. https://ideas.repec.org/p/pra/mprapa/25480.html

Affandi, Y., Anugrah, D., & Bary, P. (2018). Human capital and economic growth across regions: a case study in indonesia. *Eurasian Economic Review, 9*(3), 331-347. https://doi.org/10.1007/s40822-018-0114-4

Ahmad, H.N., & Akaram, M. (2007). The incident of government expenditure on education and health: Macroeconomic evidence from Pakistan. *Lahore Journal of Economics, 12*(2), 27-48. https://ideas.repec.org/a/lje/journl/v12y2007i2p27-48.html

Al-Yousifa, K. Y. (2008). Education expenditure and economic growth: Some empirical evidence from the GCC countries. *Journal of Developing Areas, 42* (1), 68-80. https://ideas.repec.org/a/jda/journl/vol.42year2008issue1pp69-80.html

Amir, H. (2023). Efficacy of investment in educational institutes and human capital for sustainable economic growth in pakistan. *Annals of Human and Social Sciences, 4*(II). https://doi.org/10.35484/ahss.2023(4-ii)54

Bachama, Y., Hassan, A., & Ibrahim, B. (2021). The impact of human capital on nigeria's economic growth. *European Scientific Journal Esj, 17*(15). https://doi.org/10.19044/esj.2021.v17n15p393

Baldacci, E., Clements, B., Gupta, S., & Cui, Q. (2008). Social spending, human capital, and growth in developing countries. *World Development*, *36*(8), 1317-1341. https://www.imf.org/external/pubs/ft/wp/2004/wp04217.pdf

Barro, R.J., & Sala-i-Martin, X. (1995). *Economic Growth.* MIT Press. http://piketty.pse.ens.fr/files/BarroSalaIMartin2004Chap1-2.pdf

Benoit, K., Noël, T., Essohanam, P., & Porto, B. (2022). Analysis of human capital effects: A systematic review of the literature. *International Journal of Human Resource Studies, 12*(4), 17. https://doi.org/10.5296/ijhrs.v12i4.20506

Bisio, L., & Lucchese, M. (2023). Chapter Educational mismatch and productivity: evidence from LEED data on Italian firms. In *ASA 2022 Data-Driven Decision Making*. Firenze University Press, Genova University Press. https://media.fupress.com/files/pdf/24/13712/37771

Blankenau, W. F., Simpson, N. B., & Tomljanovich, M. (2007). Public education expenditures, taxation, and growth: Linking data to theory. *American Economic Review*, *97*(2), 393-397. https://www.aeaweb.org/articles?id=10.1257/aer.97.2.393

Craigwell, R., Shane, L., & Byone, D. (2012). The effectiveness of government expenditure on education and health care in the Caribbean. *International Journal of Development Issues, 2*(1), 4-18. http://dx.doi.org/10.1108/14468951211213831

Dahal, M. P. (2012). Higher educational enrolment, school teachers and GDP in Nepal: A causality analysis. *Economic Journal of Development Issues, 11* (2010&2011), 69-91. http://dx.doi.org/10.3126/ejdi.v11i0.6107

Devlin, N., & Hansen, P. (2001). Health care spending and economic output: Granger causality. *Applied Economics Letters, 8*(8), 561-564. http://dx.doi.org/10.1080/13504850010017357

Easterly, W., & Rebelo, S. (1993). Fiscal policy and economic growth: An empirical investigation. *Journal of Monetary Economics, 32* (3), 417-458. https://doi.org/10.1016/0304-3932(93)90025-B

Eggoh, J., Houeninvo, H., & Sossou, G.A. (2015). Education, health, and economic growth in African countries. *Journal of Economic Development, 40* (1), 93-111. http://dx.doi.org/10.35866/caujed.2015.40.1.004

El-Dib, M. A., & Moawad, R. R. (2023). An ARDL approach to investigating the link between education spending and economic growth in Egypt. *Information Sciences Letters*, *12*(8), 2735-2745. http://dx.doi.org/10.18576/isl/120824

Fardoush, Z. (2021). *Reduced inequalities*. Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-95882-879

Gao, S. (2024). Analysis of the role of human capital on economic growth in the Beijing-Tianjin-Hebei., 289-309. https://doi.org/10.47260/amae/14515

Hunt, F. J. (1982). Education and the Constrained Economy: Exploration of a thesis. *British Journal of Sociology of Education*, *3*(3), 235-248. https://www.jstor.org/stable/i260401

Jeng, R., Gane, J., & Lages, R. (2019). *Effect of education on income inequality: A cross-national study*. http://hdl.handle.net/1853/62056

Khan, H.N., Khan, M.T., Razli, R.B., Sahfie, A.B., Shehzada, G., Krebs, K.L., & Sarvghad, N. (2016). Health care expenditure and economic growth in SAARC countries (1995-2012): A panel causality analysis. *Applied Research in Quality Life (Springer), 11*(2015), 1-23. http://dx.doi.org/10.1007/s11482-015-9385-z

Kocevska, K. (2023). Public expenditure on education and economic growth: Evidence from north Macedonia. *Journal of Liberty and International Affairs Institute for Research and European Studies - Bitola, 9*(1), 22-34. https://doi.org/10.47305/jlia2391022shk

Lacheheb, M., Nor, N.M., & Baloch, I. (2014). *Health expenditure, education and economic growth in MENA countries.* MPRA Paper No.60388, (December, 2014), 1-17. https://mpra.ub.uni-muenchen.de/60388/

Lee, N. (2000). Education and economic growth in Korea, 1966-1997. *Journal of Applied Business Research, 16*(4), 83-93. http://dx.doi.org/10.19030/jabr.v16i4.2056

Li, C. (2023). The restraining effect of human capital mismatch and structure distortion on economic growth -- a new structural economics analysis. *International Journal of Financial Research, 14*(2), 1. https://doi.org/10.5430/ijfr.v14n2p1

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3-42. https://doi.org/10.1016/0304-3932(88)90168-7

Maitra, B., & Mukhopadhyay, C. K. (2012). Public spending on education, health care and economic growth in selected countries of Asia and the Pacific. *Asia-Pacific Development Journal*, *19*(2), 19-48. http://dx.doi.org/10.18356/e7c7bcb7-en

Ministry of Finance. (2022). Economic Survey 2021/2022. Government of Nepal. https://www.mof.gov.np/uploads/document/file/1674635120Economic_Survey2022.pdf

Mugizi, W. (2018). The role of higher education in achieving Uganda vision 2040. *Elixir The Social Studies, 115*(2018), 49831-49837. https://www.researchgate.net/publication/323393914_The_Role_of_Higher_Education_in_Achieving_Uganda_Vision_2040

Musila, J. W., & Belassi, W. (2004). The impact of education expenditures on economic growth in Uganda: Evidence from time series data. *The Journal of Developing Areas*, *38*(1), 123-133. http://dx.doi.org/10.1353/jda.2005.0015

NRB (Nepal Rastra Bank) (2022). *Quarterly Economic Bulletin, Mid- April 2022.* Nepal Rastra Bank. https://www.nrb.org.np/category/economic-bulletin/quarterly-economic-bulletin/

Permani, R. (2009). The role of education in economic growth in East-Asia: A survey. *Asian-Pacific Economic Literature,23*(1),1-20. https://doi.org/10.1111/j.1467-8411.2009.01220.x

Piran, M., Sharifi, A., & Safari, M. M. (2023). Exploring the roles of education, renewable energy, and global warming on health expenditures. *Sustainability*, *15*(19), 1-11. https://doi.org/10.3390/su151914352

Romer, P.M. (1990). *Are non-convexities important for understanding growth?* [NBER Working Paper, (w3271)]. National Bureau of Economic Research, https://www.nber.org/papers/w3271

Shahzad, S., Yasin, A., & Luqman, M. (2022). Human capital the key to economic growth: Some new evidence from selected developing countries. *Journal of Business and Social Review in Emerging Economies, 8*(1), 61-70. https://doi.org/10.26710/jbsee.v8i1.2135

Tatlah, I. A., Naz, F., & Iqbal, M. Z. (2011). Role of human capital and education in economic growth. *International Journal of Academic Research*, *3*(2), 629-631. https://www.researchgate.net/publication/333797814

Wang, M. (2024). The mutual shaping mechanism between new quality productive forces and educational equity. *Journal of Infrastructure, Policy and Development*, *8*(12), 1-18. http://dx.doi.org/10.24294/jipd.v8i12.5707

Xingyang, Y. and Liu, M. (2021). Relationship between human capital and technological innovation growth of regional economy and psychology of new entrepreneurs in northeast china. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.731284

Yan, W.S., & Yusoff, R. (2018). Public education expenditure: A review on selected issues and analysis. *Malaysian Journal of Business and Economics, 5 (*2), 29-40. https://doi.org/10.51200/mjbe.v0i0.1608

Zhang, J. & Casagrande, R. (1998). Fertility, growth, and flat rate taxation for education subsidies. *Economics Letters, 60*(2), 209-216. https://ideas.repec.org/a/eee/ecolet/v60y1998i2p209-216.html