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Capital Formation, Foreign Aid, Human Capital Development and Economic Growth in Nepal

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Abstract

Background: Capital formation and foreign aid provide funds for the investment in developing countries for infrastructure development and acceleration economic progress. Educated, skillful and healthy human capital plays a vital role for the long-run economic development. Therefore, this paper aims to investigate the effect of capital formation, foreign aid and human capital development on economic growth in Nepal.

Methods: This study applies ordinary least square modeling based on causal research design for the examination of impact of gross fixed capital formation (GFCF), foreign aid such as foreign grants (GRANT), foreign debt (DEBT), World Bank debt (WBD) and human capital development (HCD) on economic growth. Gross domestic per capita (GDPPC) is considered as economic growth and GFCF, GRANT, foreign DEBT, WBD and secondary school enrolment as HCD are considered as explanatory variables.

Results: This study reveals capital formation has dominant role in economic growth and Nepalese government needs to focus on sufficient capital formation for the acceleration of rapid economic development. This paper explores foreign aid that plays significant role in bridging deficit budget and accelerates economic development. Government needs to use foreign aid for

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infrastructure development and rapid economic growth. However, secondary school enrolment as HCD does not have imperative positive influence because secondary education has expanded only in numbers but lack of quality, knowledge, skills to meet job market needs, more migration for low skill works and policy weakness of human capital development are the reasons of unexpected effect on economic growth in Nepal.

Conclusion: This study concludes capital formation and foreign aid have leading role for economic growth. Nepalese policy makers, government and bureaucrats need to emphasize to articulate and implement various policies for formulation of more capital and optimum utilization of foreign aid for the rapid acceleration of economic development. Policy maker should formulate human capital polity emphasizing in improving education quality, knowledge, skills to meet market needs via fostering innovation, integrating digital skills, retaining talent human resources to accelerate productivity for rapid economic growth.

Novelty: The novelty of this paper is integrated approach to examine combined effect of capital formation, foreign aid and human capital development on economic growth. This study unifies drivers of economic development within a single framework via holistic approach for achieving inclusive and sustainable economic development.

Keywords: Foreign aid, foreign debt, grants, human capital, capital formation

Introduction

Investment in private and government sectors is engine of the economic development. Different economic and financial factors affect the acceleration of economic growth dynamically and proactively (Khan et al. 2022). Investment of any economy is affected by the fixed capital formation which leads to stimulate economic development. Capital formation involves for the accumulation of physical assets such as infrastructure. A thorough assessment is needed to understand whether foreign aid has been effectively used to support infrastructure development that drives economic productivity (Cecen et al., 2014). The size of government spending on fixed capital plays a significant positive role for the acceleration of economic growth (Al-Fawwaz, 2016). Both investments made by the public sector and private entities play a crucial and beneficial role in the accumulation of fixed capital, which is essential for driving economic development and providing valuable guidance for enhancing growth rates (Bahal et al., 2018). Moreover, gross capital formation (GCF), which signifies the aggregate value of a nation's investment in physical assets, is positively correlated with economic growth in both the short run and the long run, underscoring its role as a crucial factor for ongoing economic development (Poku et al., 2022).

Foreign aid is recognized as an international financial support employed in developing and underdeveloped countries to reduce poverty and enhance their economic conditions (Adebayo & Kalmaz, 2020; Dutta et al., 2016). The increase in foreign aid (FA) is related with more inequality of income of different economies (Younsi et al., 2019). The FA has U-shaped association with economic growth (Yiew & Lau, 2018). FA has the inverse long-run effect on economic growth for the most of the economies (Mallik, 2008). FA has a significant long-run positives association with economic development (Fasanya & Onakoya, 2012). Foreign aid (FA)

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includes concessional loans, grants, technology, kind assistance etc. afforded by developed countries/partners to the resource-limited economies. It is integrated into national budget that managed through treasury and it helps to fill the financial gap for supporting government spending. The most portion of deficit budget of Nepal is financed from foreign aid (Ministry of Finance, 2023). FA supports various sectors such as infrastructure, healthcare, education, governance etc. However, its overall effect on economic growth remains argumentative. Some studies highlight a positive link between foreign aid and GDP growth, others argue that foreign aid is frequently misallocated, prioritizing for humanitarian and social welfare initiatives rather than more productive sectors (Pradhan & Phuyal, 2020; Ray, 2023).

Human capital plays a vital role for the long-run economic growth. It refers human knowledge, skills, health etc. measured by education level, age of population, health indicators etc. Good health and education of human directly affect the economic acceleration of any economy in long-run. Human capital development is process of gaining knowledge, increasing skills (capacity & creativity) and maintaining good health to improve ability of human resource to increase productivity for the economic growth. Human capital development (HCD) is the expenditure on education, health and enrollment (Hanif & Arshed, 2016). There is positive relationship between human capital and economic growth (Camps-Cura, 2016). Population growth (proxy for labor force) has no significant effect on GDP growth (Fasanya & Onakoya, 2012). Labor force inversely influences economic growth both in short and long-runs (Girma, 2015). Working age population has insignificance influence on economic growth (Tang & Bundhoo, 2017). Working age population have an adverse effect on economic growth because of political instability, migration and brain drain (Paudel & Acharya, 2020).

The performance of Nepal's economy has been weaker compared to other South Asian economies. Throughout the past decade, Nepal's average GDP growth rate has fallen short of the average GDP growth rate achieved by South Asian countries (World Bank, 2023). International financial assistance plays a vital role for the nation's financing. Nepal government has managed budget deficits of the fiscal year 2023/024 from the combination of foreign loans and grants (Ministry of Finance, 2023). Nepal is presently benefiting from a demographic prospectives. The working age of population is 65.28 percent, the secondary school enrollment rate is relatively high at 89.55 percent that indicates a large portion of youth are receiving education at this level, thereby strengthening the potential labor force (World Bank, 2023). Despite this advantage, Nepal appears to be underutilizing its workforce and 2.191 million Nepalese people are residing abroad (National Statistics Office, 2021).

Fixed capital formation, foreign aid and labor availability are key factors influencing a country's economic development of an economy. The capital formation and foreign aid provide funds for the investment that significantly support for the infrastructure development and accelerate economic progress. Similarly, a large size of working age population with sufficient capital, can boost production capacity, thereby contributing to promote the overall economic growth of the nation. This research explores how capital formation, foreign aid, and human capital impact Nepal's economic growth. It aims to provide policymakers with a better understanding of the significance of international economic cooperation in the nation's

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development and to propose ways in which foreign aid can be utilized more effectively and strategically to foster sustainable growth in Nepal.

This study explores the research questions: what are impacts of capital formation, foreign aid, and human capital on Nepal's economic growth? The primary aim of this paper is to examine how gross fixed capital formation, foreign aid, and human capital influence economic growth in both the short and long runs in Nepal.

Remaining sections of this paper are delineated as: section two deals with literature review and hypothesis development. In addition, section three describes research methods. Further, section four of this research presents estimated results and discussion. Finally, section five of the study summarizes and draws conclusion based on results and findings along with implication of the study.

Literature Review

Capital formulation is essential for managing physical assets such as building, machinery, infrastructure etc. that has a significant role and contribute to production activities of any economy. The capital accumulation via investment and labor are fundamental factors of production for the economic growth (Samuelson & Nordhaus, 2009). A research study in Bangladesh found a significant positive impact of savings as proxy of investment on economic growth (Islam, 1992). Bista (2006) investigated foreign aid economic growth relationship based on Harrod-Domar as well as two-gap models and revealed investment expenditure has significant effect in economic growth in Nepal. In the study of six aid-depended poor countries, Mallik (2008) revealed a long-run relationship between investment and GDP per capita and observed insignificant short-run effect of foreign aid and a negative impact in long-run. Foreign aid accelerates economic growth and private investment significantly and positively impact on economic growth both in short and long-runs (Kargbo, 2012). The size of government spending on fixed capital plays a significant positive role for the acceleration of economic growth (Al-Fawwaz, 2016).

Both public and private investments have significant positive role in fixed capital formation and insights to accelerate economic growth (Bahal et al., 2018). Pradhan and Phuyal (2020) found that investment does not have a significant effect on economic growth, while factors such as foreign aid, labor, and remittances are taken into consideration. Similarly, research by Girma (2015) and Kirikkaleli et al. (2021) indicates that capital formation has an insignificant influence on economic development. On the other hand, Poku et al. (2022) report that gross capital formation (GCF) is positively linked with economic growth in both the short term and long term. However, capital formation originating from foreign direct investment (FDI) does not appear to have an immediate or significant impact on economic growth, however, one year lag capital formation shows a significant positive impact on economic development; foreign aid has significant role in reducing resources gap and stimulate economic transactions in Nepal (Saud, 2023).

Foreign aid has the inverse long-run effect on economic growth for the most of the economies (Mallik, 2008). Hussen and Lee (2012) investigated effect of foreign aid on economic growth applying ARDL cointegration and observed a negative impact of foreign aid on economic

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development even though effectiveness of aid improved with the stable and sound macroeconomic policies (<u>Hussen & Lee, 2012</u>). A study based on neo-classical production function modeling revealed a significant positive association between foreign aid and economic development in long-run highlighting appropriate institutions are essential for the effectiveness of foreign aid for economic growth (<u>Fasanya & Onakoya, 2012</u>).

The FA has U-shaped association with economic growth (Yiew & Lau; 2018). The increase in foreign aid (FA) is related with more inequality of income (Younsi et al.,2019). Foreign aid is considered as global strategy applied in under developing and developing countries for the poverty alleviation and improve the economic status of the nations (Adebayo & Kalmaz, 2020; Dutta et al.,2016). Foreign aid is received mostly by developing economies as ODA (official development assistance) to make financial flows for accelerating economic development often focusing supply side of aid with the careful of donor-driven (Kenny, 2020).

Foreign aid includes grants, loans, kind assistance, technology etc. provided by the developed countries/partners to the poor (resource-limited) economies; aid is integrated in national budget which is managed via treasury and it fills financial gap of government spending. A significant portion of budget deficit is managed (financed) by Nepalese government from foreign aid (Ministry of Finance, 2023). FA supports various sectors such as infrastructure, healthcare, education, governance etc. However, its overall effect on economic growth remains argumentative. Some studies highlight a positive link between foreign aid and GDP growth, others argue that foreign aid is frequently misallocated, prioritizing for humanitarian and social welfare initiatives rather than more productive sectors (Pradhan & Phuyal, 2020; Ray, 2023). Human capital refers to the health, knowledge, skills etc. of the workforce often measured by working population, age, health indicators, education etc. Literature shows human capital has the significant role in economic development. However, some studies observe insignificant and negative effect of growth of labor force on economic development. Population growth as proxy of labor has insignificant influence on gross domestic product (Islam, 1992; Fasanya & Onakoya, 2012). Labor force has inverse relationship with economic growth in short-run as well as longrun (Girma, 2015). Good health and education of human directly affect the economic acceleration of any economy in long-run. Human capital development is process of gaining knowledge, increasing skills (capacity & creativity) and maintaining good health to improve ability of human resource to increase productivity for the economic growth. Human capital development (HCD) is the expenditure on education, health and enrollment (Hanif & Arshed, 2016). There is positive relationship between human capital and economic growth (Camps-Cura, 2016).

Foreign aid positively influences economic growth with formulation and implementation of good policies whereas working age human capital have insignificant impact on economic acceleration (Tang & Bundhoo, 2017). Working age population have inverse effect on economic growth because of political instability, migration and brain drain of Nepal (Paudel & Acharya, 2020). Human capital (proxied by labor force) participation rate has significant role in economic growth for both short and long-runs; however, foreign aid has positive, but, insignificant influence in

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economic growth because of foreign aid is not often used in more productive sectors and Nepal should make major structural changes for rapid economic acceleration (Pradhan & Phuyal, 2020). In the analysis of macroeconomic determinant affecting economic development of Nepal, Kumar (2024) used time series data with application of ordinary least square regression modeling and revealed significant positive influence of capital formation and modest positive effect total expenditure on economic development and negligible negative effect of net exports. Poudel (2025) examined the effect of gross fixed capital formation, imports and exports on economic growth using time series data based on ARDL approach and revealed exports has significant effect on economic growth in long run, however imports have inverse impact. The result of the study concludes gross fixed capital formation plays significant role for boosting economic growth in Nepal.

The influence of capital formation, foreign aid and human capital on economic growth has been examined across various developed and developing countries. Limited studies have been made foreign aid and economic growth in Nepal. However, there remains a significant lack of in-depth research analyzing the combined effects of capital formation, foreign aid, human assets on economic growth for formulating the appropriate policy framework of Nepal. Therefore, this study addresses this research gap and aims to provide valuable insights to the policy makers to make positive international development cooperation to attract more foreign aids toward Nepal for rapid acceleration of economic growth. To address the research question, based on review of previous studies, three hypotheses are formulated as follows:

Hypothesis 1 (H₁): Capital formation has a significant impact on economic growth in Nepal.

Hypothesis 2 (H₂): Foreign aid has significant positive effect on economic growth in Nepal.

Hypothesis 3 (H₃): Human capital has a favorable influence on economic growth in Nepal.

Research Methods

This paper has used a quantitative research technique. In this study, causal comparative research design has been applied to investigate the impact of capital formulation, foreign aids and human capital development on economic growth. This research has examined long-run relationship of gross fixed capital formulation, foreign aids and human capital with economic development in Nepal. This paper has considered GDP per capita as dependent variable and gross fixed capital formation, foreign aids and human capital development as explanatory variables.

This study utilizes secondary time-series data spanning the years 1991 to 2023. The required data were sourced from the World Bank's World Development Indicators database, the Economic Surveys of the Ministry of Finance, and Nepal Rastra Bank. In total, 33 annual observations were analyzed to examine the effects of the explanatory variables on economic development over the study period. The obtained data were processed and analyzed based on tenth version E-views software. In this paper, Ordinary Least Square (OLS) regression models along with adjusted R², F-test, t-test, DW test and multicollinearity test etc. have been made to investigate the impact of gross fixed capital formation, foreign aid and human capital on economic development in Nepal. Econometric models of equation (1) have been used to

Vol. 8, No. 4, September 2025. Pages: 161-174

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investigate the relationship of capital formation, foreign aid and human capital with economic development based on OLS approach.

$$LnGDPPC_t = \alpha_0 + \beta_1 LnGFCF_t + \beta_2 LnFAID_t + \beta_3 LnHCD_t + \varepsilon_t \qquad ... \qquad (1)$$

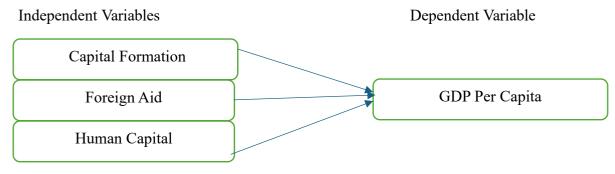
The equation (1) can be expanded into the following three equations:

$$LnGDPPC_t = \alpha_0 + \beta_1 Ln \ GFCF_t + \beta_2 LnGRANT_t + \beta_3 LnHCD_t + \varepsilon_t \quad ... \tag{1a}$$

$$LnGDPPC_t = \alpha_0 + \beta_1 LnGFCF_t + \beta_2 LnDEBT_t + \beta_3 LnHCD_t + \varepsilon_t \qquad ... \qquad (1b)$$

$$LnGDPPC_t = \alpha_0 + \beta_1 LnGFCF_t + \beta_2 LnWBD_t + \beta_3 LnHCD_t + \varepsilon_t \qquad ... \qquad (1c)$$

GDPPC indicates gross domestic product per capita, GFCF represents gross fixed capital formation, FAID stands for foreign aid, FAID includes GRANT, DEBT, and WBD, where GRANT stands for total external grants, DEBT indicates total foreign debt, WBD is the world bank debt, HCD represents human capital development, α_0 represents for intercept term, β_1 , β_2 , β_3 stand for regression coefficients of explanatory variables, Ln is natural logarithm and ε_t indicates error term at t-time. The conceptual framework of this study is presented in Figure 1.



Source: Author's construction

Figure 1: Research Framework of the Study

Results and Discussion

In general, regression analysis is made to estimate the statistical relationships of dependent and independent variables. In this research, regression analysis is made to examine effect of explanatory variables on dependent variable and analyze the explanatory power of capital formation, foreign aid and human resource development to explain the economic growth. Regression results of capital formation, grants and human capital development of this paper are presented in Table 1.

Vol. 8, No. 4, September 2025. Pages: 161-174

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Table 1: Capital Formation, Grants, Human Capital Development and Economic Growth

Variables	Coefficients	Standard-error	t-statistics	P-value
Constant	1.037	0.545	1.903	0.047
LnGFCF	0.784	0.096	8.157	0.005
LnGRANT	0.096	0.040	2.416	0.026
LnHCD	- 0.352	0.088	-4.014	0.002
Adjusted R ²	0.723	N	33	
F-statistics	45.169	DW	1.973	
P-value	0.003	VIF	1.025 to 1.462<10	

Table 1 presents the regression results for capital formation, foreign grants, and human capital. The regression coefficient for GFCF is 0.784, indicating that gross fixed capital formation has a positive and statistically significant effect on economic growth at the 1 percent level. This finding is supported by previous studies such as Islam (1992), Bista (2006), Al-Fawwaz (2016), Bahal et al. (2018), and Poku et al. (2022). Furthermore, results reveal that foreign grants, viewed as foreign aid, play an important role in accelerating Nepal's economic growth. This outcome aligns with the findings of Fasanya and Onakoya (2012), Dutta et al. (2016), Adebayo and Klmaz (2020), Kenny (2020), and the Ministry of Finance (2023), but contrasts with the conclusions drawn by Hussen and Lee (2012). On the other hand, human capital development unexpectedly shows a negative impact on economic growth in Nepal. This observation is consistent with the studies by Girma (2015) and Poudel and Acharya (2020), while differing from the results reported by Camps-Cura (2018). Adverse effect of human capital on economic growth are the reasons of brain drain of high skilled worker, mismatch of market needs, high education costs, low quality of education, inequal access of education etc.

The coefficient of determination (adjusted R²) indicates that gross fixed capital formation, foreign grants and human capital development have 72.3 percent explanatory power to explain economic growth in Nepal. This implies that these factors significantly impact on economic growth because capital formation boosting productivity, foreign aid supporting investments though human capital has no expected effect. The estimated VIF (variance inflation factor) measures degree of multicollinearity between explanatory variables and VIF results of all explanatory variables are less than 10 which indicates lack of multicollinearity problems among explanatory variables. F-statistics conforms model is well fitted and is significant at 1 percent level. DW-statistics indicates no problems of autocorrelation.

Regression results for the examination of impact of foreign debt as the foreign aid, gross fixed capital formation, and human capital development on economic growth in Nepal are estimated and presented in Table 2.

Vol. 8, No. 4, September 2025. Pages: 161-174

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Table 2: Foreign Debt, Capital Formation, Human Capital Development and Economic Growth

Variables	Coefficients	Standard Error	t-statistics	P-value
Constant	0.973	0.480	2.026	0.039
LnDEBT	0.106	0.045	2.347	0.037
LnGFCF	0.934	0.091	10.315	0.006
LnHCD	- 0.418	0.106	-3.954	0.008
Adjusted R ²	0.814	N	33	
F-statistics	51.469	DW	1.895	
P-value	0.003	VIF	1.037 to 1.518<10	

Table 2 presents the regression results examining the impact of foreign debt, capital formation, and human capital on economic growth. The regression coefficient for DEBT is 0.106, indicating that foreign debt, considered as foreign aid, positively influences economic growth and is statistically significant at 5 percent level. This finding aligns with the studies conducted by Fasanya and Onakoya (2012), Dutta et al. (2016), Adebayo and Klmaz (2020), Kenny (2020), and the Ministry of Finance (2023), but contradicts the results reported by Hussen and Lee (2012). Additionally, the analysis highlights that gross fixed capital formation plays a crucial role in driving economic growth in Nepal, corroborating the findings of Islam (1992), Bista (2006), Al-Fawwaz (2016), Bahal et al. (2018), and Poku et al. (2022). On the other hand, human capital development appears to have a negative impact on Nepal's economic growth. This outcome is in agreement with the research of Girma (2015) and Poudel and Acharya (2020), yet it contrasts with the findings of Camps-Cura (2018). Negative impact of human capital on economic growth are the reasons of low quality of education, brain drain of high skilled worker, mismatch of market needs, high education costs, low quality of education, inequal access of education etc.

The adjusted R² 0.814 indicates that foreign debt, gross fixed capital formation, and human capital development have 81.4 percent explanatory power to explain economic growth in Nepal. This indicates that explanatory variables have significant impact on economic growth because capital formation boosts productivity, and foreign aid supports investments though human capital has no effect as expectation in Nepal. The estimated VIF of all explanatory variables are less than 10 which indicates lack of multicollinearity problems among explanatory variables. F-statistics conforms model is well fitted and is significant at 1 percent level. DW-statistics indicates no problems of autocorrelation.

Vol. 8, No. 4, September 2025. Pages: 161-174

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Table 3: World Bank Debt, Capital Formation, Human Capital Development and Economic Growth

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Variables	Coefficients	Standard Error	t-statistics	P-value
Constant	1.079	0.526	2.053	0.037
LnWBD	0.084	0.028	3.015	0.023
LnGFCF	0.783	0.064	12.216	0.004
LnHCD	- 0.378	0.112	-3.365	0.018
Adjusted R ²	0.792	N	33	
F-statistics	48.354	DW	1.917	
P-value	0.003	VIF	1.014 to 1.729<10	

Table 3 presents the regression results concerning World Bank debt, capital formation, and human capital development. The regression coefficient for World Bank debt (WBD) is 0.084, suggesting that foreign aid in the form of World Bank debt positively impacts economic growth, with significance at 5 percent level. This outcome aligns with the findings of Fasanya and Onakoya (2012), Dutta et al. (2016), Adebayo and Klmaz (2020), Kenny (2020), and the Ministry of Finance (2023), but contrasts with the conclusions of Hussen and Lee (2012). Furthermore, the results indicate that gross fixed capital formation plays a crucial role in economic development, supporting the findings of Islam (1992), Bista (2006), Al-Fawwaz (2016), Bahal et al. (2018), and Poku et al. (2022). However, human capital development unexpectedly has a negative effect on economic growth in Nepal, a finding consistent with Girma (2015) and Poudel and Acharya (2020), yet contrary to Camps-Cura (2018). Contrary effect of human capital on economic growth are the reasons of brain drain of high talent worker, mismatch of market needs, high education costs, low quality of education, inequal access of education etc.

The adjusted R² 0.792 indicates that World Bank debt, gross fixed capital formation, and human capital development have 79.2 percent explanatory power to explain economic growth in Nepal. This implies that gross fixed capital formation and foreign aid have significant effect on economic growth because capital formation is boosting productivity, foreign aid is supporting investments even though human capital indicator has no significant effect as per expectations. The estimated VIF results of all explanatory variables are less than 10 which indicate lack of multicollinearity problems among explanatory variables. F-statistics conforms model is well fitted and is significant at 1 percent level. DW-statistics indicates no problems of autocorrelation. Results of this research suggest to accept first and second hypotheses and reject the third hypothesis and the results indicate capital formation and foreign aid have significant influence but human capital development has no positive effect for the economic development in Nepal.

Conclusion

This study aims to explore how capital formation, foreign aid, and development of human capital influence economic growth. This study reveals capital formation has dominant role in economic growth in Nepal. Therefore, Nepalese government needs to focus on sufficient capital formation for the investment to accelerate rapid economic development. In addition, this paper explores foreign aid (foreign grants, foreign debt, & World Bank debt) plays

Vol. 8, No. 4, September 2025. Pages: 161-174

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significant role for the acceleration of economic development via bridging deficit budget. Government needs to use foreign aid for the infrastructure development that helps for rapid economic growth. However, human capital development (secondary school enrolment) does not have imperative positive outcome on economic growth. Adverse effect of human capital on economic growth are the causes of brain drain of high skilled worker, mismatch of market needs, high education costs, low quality of education, inequal access of education etc.

Finally, study concludes capital formation and foreign aid have leading role for the economic growth and Nepalese government should focus on formulation of more capital and maximum utilization of foreign aid. Policy makers of Nepal need to emphasize in formulating sufficient capital and attracting more foreign aid for the rapid acceleration of economic development. Policy makers should formulate human capital polity emphasizing in improving education quality, knowledge, skills to meet market needs via fostering innovation, integrating digital skills, retaining talent human resources to accelerate productivity for rapid economic growth in Nepal.

This study is only based on 33-year time series data. Future studies need to be administered considering more observations using long period time series data. Similar studies in future are suggested to be administered along with unit root tests for the use of the best modeling for the analysis of time series data with consideration potential endogeneity issues based on causality tests, instrumental variable approach etc. This paper considers has considered only three explanatory variables such as fixed capital formation, foreign aid and human capital development, further studies need to incorporate other variables such as foreign direct investment, remittance, size of government, quality of labor, trade openness, government expenditure in health etc. to examine their impact on economic growth.

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Authors' Contributions: The authors conducted all research activities i.e., concept, data collecting,

drafting and final review of manuscript.

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