EFFECT OF POPULATION GROWTH IN ECONOMIC GROWTH IN NEPAL

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Abstract

The study examined the relationship between the population growth and economic development issues in Nepal using time series data spanning from 1971 to 2021. The study adopted an ex-post facto research design and, obtained secondary data from the publication of the National Population and Housing Census 2021, National Report, Nepal. The data were analyzed using ordinary least square estimation technique. Descriptive and Analytical statistics tools are used to analyze the data. The findings of the study revealed that growth of the economically active population in agriculture, industry and service sectors significantly affect the Human Development Index measured by total GDP in Nepal. The research concludes that economically active population growth in these sectors have a positive impact in Nepal.

Keywords: Population growth, Economic Development, Economically active population.

INTRODUCTION

Development is the process of improving the quality of existence for people. An important indicator of development is the rise in people's standard of living, while the others are the rise in people's self-esteem and the freedom to choose products and services (Todaro, 1997). Real per capita income is influenced positively by the growth rate of real GDP or GNP and negatively by population growth. Thus, economic development is dependent on economic growth. A nation's growth can be distributed among its citizens to reduce destitution and foster a more equitable society.

Population and economic development may have a positive or negative relationship. National or domestic output is the foundation for economic growth. Production is impossible without labour force, and labour force is the largest component of the population. In this way, population becomes the foundation of production and, consequently, economic growth. As economic development is measured by per capita income, population growth that increases the size of the national population decreases per capita production or per capita income. In this way, population negatively impacts economic development. Participation in production activities contributes to economic growth among economically active populations.

Development is the center of all economic activities. During the last quarter of 20^{th} century, development has emerged with a human dimension. Development is meaningless if it is not translated into real lives of the people. The relationship between population and economic development has been a subject of debate and research since long. The features of population dynamics and its linkage with socio-economic factors tremendously contribute to effective planning and issues relevant to population and development (Afzal, 2011).

During the pandemic, the government's top priority is protecting the lives of all people and making the necessary arrangements for a humanitarian livelihood. Due to the prolonged lockdown, Nepal's economic growth rate remained significantly negative at 2.12 percent for the first time in the last two decades, surpassing the economic losses caused by the devastating earthquake in fiscal year 2014/15. The GDP is projected to increase by 3.94 percent at the base price and 4.01 percent at the producer price in 2020/21. Due to the second wave of Covid-19, achieving the projected economic development has become increasingly difficult. Agriculture, industry, and the service sector are projected to contribute 20, 2, and 60, 2 percent, respectively, to the expansion of the gross domestic product (at constant prices) in fiscal year 2020/21. The contribution of the agriculture sector was 30,7 percent in the previous fiscal year, while the contributions of the industry and service sectors were negative by 27,4 percent and 103,2 percent, respectively (MOF, 2021).

In fiscal year 2020/21, it is anticipated that the GDP per capita at current prices will increase by 7.5% to $1,191 (Rs. 140,819). In fiscal year 2019/20, the GDP per capita was $1126 (Rs. 130,957). In the past decade, the average annual development rate of per capita GDP was 9.2%. The GDP per capita at constant prices (fiscal year 2010/11) is

projected to increase by 2.6% to Rs. 78,646 in fiscal year 2020/21. During fiscal year 2019/20, this income decreased by 3.9% to Rs. 76,636. The average per capita GDP growth rate at constant prices over the past decade was 3.0%. After adjusting for the change in base year, the per capita gross national income (at current prices) was $1,139 in fiscal year 2019/20. It is projected to increase by 5.0 percent to $1,196 in fiscal year 2020/21. In fiscal year 2020/21, the disposable income per capita has reached $1,486, a record high. During fiscal year 2019/20, this income was $1,422 (MOF, 2021).

LITERATURE REVIEW

Malthus (1978) Introduce the theory of the correlation between population growth and economic growth. Malthus hypothesized that the population expands at a geometric rate; however, based on the principle of diminishing return on fixed factor land, the food supply could be increased at an approximately arithmetic rate.

Todaro, (1997). Modern economists have dubbed the subsistence level of living the low level equilibrium population trap or Malthusian population trap. If income grows faster than population, per capita income rises, and vice versa. However, due to diminishing returns on land, income cannot grow faster than population indefinitely. Thus, subsistence level was planned for. Additionally, the theory implies that a higher per capita income results in a larger population, and vice versa. According to neo-Malthusian theory, a poor nation's per capita income will never raise above subsistence level unless preventative measures such as birth control are implemented. In the absence of these checks, Malthusian positive checks take effect.

Barro& Martin, (2004). According to the per capita paradigm, output per head of labour force is a function of capital per head of labour force. Per capita capital is a clearer indicator of per capita output. Higher capital per capita will result in higher per capita output, and vice versa. Savings rate, population growth rate, capital depreciation, and technological advancement are fundamental determinants of steady-state equilibrium growth. The model's basic conclusion is that a higher saving rate will result in a higher per capita income, a higher population growth will result in a lower per capita income, a higher depreciation rate will result in a lower per capita income, and a positive technological advancement will result in an increase in per capita income.

Ogunleye et al. (2018). analyzed the impact of population expansion on Nigeria's economic growth between 1981 and 2015. Using OLS regression, the researchers determined that population growth has a positive and significant effect on Nigeria's economic growth, while fertility has a negative and significant effect on Nigeria's economic growth. The exchange rate and crude mortality rate have no impact on Nigeria's economic growth.

Muhammad Haseeb et al. (2019) Indonesians examined the Environmental Analysis of the Effect of Population Growth Rate on Supply Chain Performance and Economic Growth. They discovered that t inflation affects SCP. Population expansion increases decrease the SCP. In addition, the investment growth rate and population growth rate influence SCP, which contributes to Indonesia's economic growth. Therefore, the Indonesian government must improve the supply chain in order to promote economic growth.

Hawkes &Ugur (2012) Human capital has many advantages for individuals, society, and the economy as a whole, according to those who have developed the concept. In other words, education in terms of personal health, reducing crime rates, and environmental preservation is the most significant factor in determining economic growth and development.

Pokharel et al. (2021) studied the Spatio-temporal evolution of cities and regional economic development in Nepal: Does transport infrastructure matter? They found that the core expectation derived from the NEG that transport improvements facilitate urbanization and that higher urbanization leads to higher regional GDP per capita. Two independent effects were identified in qualification of these overall patterns-the impact of market potential on city primacy and the impact of highly localized, immobile resources on GDP.

RESEARCH METHODOLOGY

The research design adopted for this study is the ex-post facto research design. The relevant data were obtained from secondary sources. These data include components of National Population and Human Census 2021, National Report, and the Population Monograph of Nepal, 2013 and 2021. The study covered spanning when Nepal had its last general population and Housing census in 1971 - 2021. Descriptive and Analytical econometric tools were applied as the method of data analysis to give empirical content to the stated objectives.

Model Specification

In this study, the linear regression model is fitted taking total GDP as function of population in the agricultural, industry and service sector:

$$Total\ GDP = f(Agri, Ind, Ser) \quad (1)$$

The following mathematical model is developed to analyze the relationship between population growth in different sectors and total GDP in Nepal taking economically active population in the sectors of agricultural, industry and service as the independent variables and against the dependent variables used as proxy for total GDP of Nepal.
This study employed the model specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu \quad (2)$$

Where Y represents Total GDP; β_0, the constant term; X_1, economically active population in agricultural sector; X_2, X_3,the economically active population in the service sector; _i, the coefficient of the independent variables X_i (i=1,2);, the error term. Here, is the error term or other variable that could have provided additional explanation for the explained variables but is not included in the model and is presumed to have a normal distribution with constant variance and zero mean.

On the basis of econometric computation, the parameter values were estimated using the least squares method and the SPSS software. In order to ascertain the relevant hypothesis, statistical significance was assessed for estimates based on the relevant statistics of regression output. The explanatory power of the model is then determined as a measure of fit.

Analysis and Presentation of Data

This investigation employed a combination of co-integration and error correction modelling via regression. The selection of these econometric techniques is predicated on their capacity to establish stationarity and test for causality between variables. Using the SPSS statistical software, the data was analysed.

Evaluation of multilinearity

Time series diagnostic tests were conducted to ensure that the model satisfied the assumptions of the traditional linear regression model. The data were subjected to diagnostic tests, including normality of the disturbance term and misspecification of the functional form, stationarity, serial correlation, and multicollinearity. The purpose of these tests is to determine if the data are normally distributed, stationary, and have no mutual correlation among the independent variables, so that they can be used in regressions without concern of producing spurious results.

Multicollinearity indicates that the independent variables are precisely correlated (Table 1). If the model's explanatory variables are precisely linearly correlated, the model's parameters become indeterminate. In any practical setting, the correlation between explanatory variables will be non-zero; however, this will generally be in accordance with expectations, in the sense that a small degree of association between explanatory variables will almost always occur, but will not result in a significant loss of precision. However, there is a problem when the explanatory variables are extremely correlated with one another.

A scatterplot matrix is a grid of scatterplots that shows the relationships between each pair of variables (Total GDP, Agricultural, Industry, and Service) in the model. The plot in Figure 1 helps visualize the bivariate relationships and potential correlations between variables.

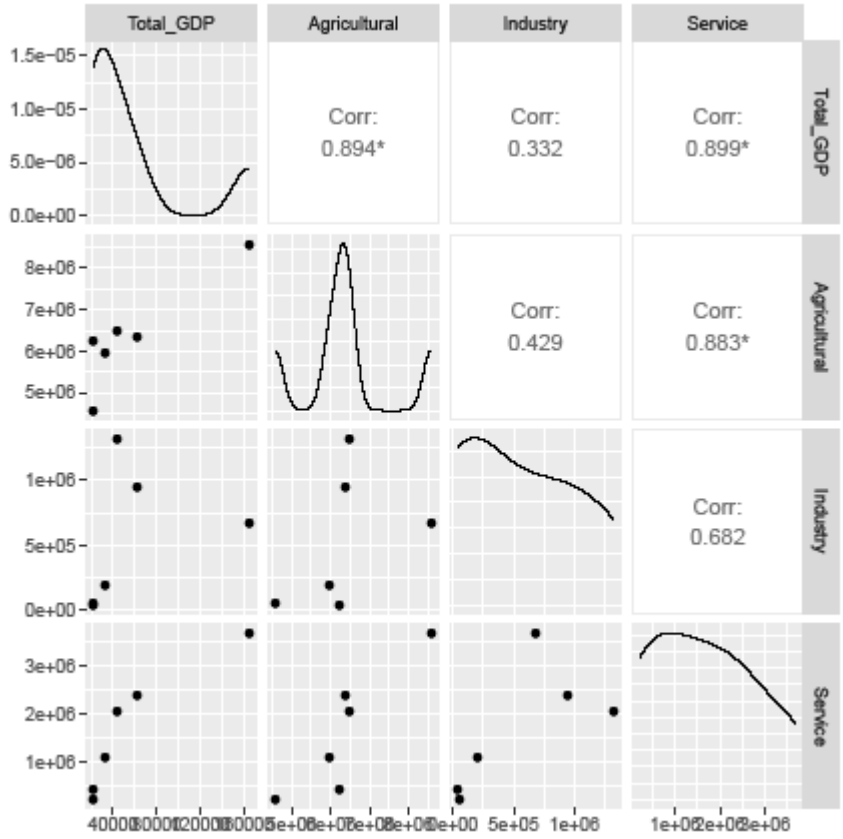

Figure 1: ScatterPlot representing the correlation between the variables.

Table 1 under diagnostic test shows multicollinearity test between independent variables. The results show the low correlation between independent variables, meaning that the independent variables are poorly correlated with each other. Therefore, there is no multicollinearity problem among the independent variables. So it appropriate to use the independent variables simultaneously in order to run the regression model since there is no multicollinearity problem (Gujarati, 2003).

RESULTS, DISCUSSION AND FINDINGS

Descriptive Statistics

Normality is also not necessary to obtain many of the results used in multivariate regression analysis as it is possible to relax this assumption and still retain most of the statistical results obtained.

From the correlation matrix in Table 1, we can confirm that there is no pair-wise correlation coefficient that is over 0.80 between independent variables except between EAP in agricultural and EAP in service sectors. Hence, the independent variables cannot be said to be collinear. Therefore, it can be concluded that there is no multicollinearity among the repressors.

Descriptive Statistics and Correlations

	Mean	S.D.	GDP	Agri	Ind	Ser
GDP	57862.533	54354.581	1			
Agri	6372102.7	1289931.3	.894*	1		
Ind	540269.17	528152.76	.332	.429	1	
Ser	1646041.7	1314075.6	.899*	.883*	.682	1

*. Correlation is significant at the 0.05 level (2-tailed).

Table 1: Descriptive Statistics and correlation coefficient between variables.
Source: Author's compilation from Population Monograph of Nepal, 2021.

Parameters Estimation Results

The values of the parameters of the model (1) are estimated by least square method using the SPSS software. The obtained results are tabulated on the table 2. Hence, the model equation gets the form:

$$Y = -9895.071 + 0.002\,X_1 - 0.052\,X_2 + 0.050\,X_3 + \mu \quad (3)$$

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9895.071	77323.876		-.128	.910
	Agri	.002	.015	.054	.149	.895
	Ind	-.052	.024	-.509	-2.195	.159
	Ser	.050	.018	1.199	2.688	.115

a. Dependent Variable: GDP

Table 2: Estimated values of parameter of the model using least square method using the data of Neapl from 2071 to 2021.

The R- squared of 0.978 and indicates that the model is a good fit, and the independent variables explain 97.8 % of changes in Total GDP.The results from the Error Correction Model and also the regression model showed that, EAP in agricultural, industry and service have positive significant relationship with economic growth represented by total GDP Table 1 and Graph 1. This illustrates that there exists both long run and short run positive relationship between population growth rate in these sectors and GDP. This implies that population growth has a positive relationship with economic growth in Nepal.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.978[a]	.957	.893	17789.53806

a. Predictors: (Constant), Ser, Ind, Agri
Table 3: Model summary of variation due to independent variables.
Source: Author's compilation from Population Monograph of Nepal, 2021

CONCLUSION

From the findings it can be concluded that population growth in agricultural, Industry and Service sectors have significant effect on total GDP in Nepal. Also, we conclude that development of economically active populations in these sectors have a positive relationship with economic development in Nepal. The motivation for this research was primarily premised on the paucity of theoretical literature on population growth and GDP in Nepal. In trying to accomplish this objective, descriptive, correction and modeling through regression is adopted for the data analysis

and statistical tests confirmed the results. The results of Johansen's co-integration test imply a long-run stable relationship between economically active population in agricultural, industry and service sectors and total GDP in Nepal. The research closes the knowledge vacuum induced by inconclusive evidence on the population growth and economic growth which most often have resulted in situations where results of researches done in developed economies are generalized to Nepal.

Nepalese government should ensure that Nepal's rising population are channeled into areas of the economy where they may more fully, effectively and efficiently utilized in bringing about high rates of economic development for the country. And also, the Nepal government should increase access to more social amenities, more infrastructural development and good security of live and properties since it negatively affectson economically active population and therefore will negatively affect Nepal's efforts to achieve increased economic growth. Moreover, efforts at providing easy of doing agricultural incentive and services should be doubled and intensified to meet the increasing requirements of the increasing population of these sectors as increased population contributes to economic growth. Finally, sufficient infrastructure including health and education should be provided by the Nepalese government for an expanding economically active population, as the population increases and makes a valued contribution to high GDP in Nepal.

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