

Human Capital Formation and Economic Growth in Tamilnadu

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Abstract

Economic growth is determined by several factors such as land, labour, capital, entrepreneurs, technologies and so on. Among the traditional factors of production labour and entrepreneur play a major role in determining economic growth. The combined efforts of labour and entrepreneur constitute human capital which is the most significant input influences output to a large extent. It is already established that there is a positive association between economic growth and human capital formation. The quality of human capital may be enhanced by investing in people especially expenditures on health and education. Human health and education positively influence economic growth. The analysis made by the authors in this research work clearly showcase the positive association between human capital formation and economic growth.

Keywords: Human capital output ratio, expenditures on health, education and social sector, economic growth

Introduction

The traditional factors of production like land, labour, capital and entrepreneur are considered as the prominent variables in the classical economics. Practically speaking, there are many variables in addition to traditional factors of production may influence economic growth. Quality of human capital is considered as an important input in determining economic growth. Level of technology, inventions, innovations and discoveries, are playing a major role in accelerating economic growth. Enhancement in the quality of human capital will result in new technology and inventions. Therefore, quality of human capital especially investment on education and health is to be considered as the prime factor in determining economic growth.

Objectives and Methodology

The major objective of this paper is to examine the nature and the pattern of association among the major macro-economic variables such as expenditures on health, education, social sector and Gross State Domestic Product in Tamil Nadu in a decade from 2015-2025. The authors used secondary data collected from various sources like various issues of Tamilnadu- An Economic Appraisals and Economic Survey. The study is descriptive and empirical in nature. The statistical tools like multiple regression, t-test and f-test are used to make the study authenticated.

Review of Literature

According to T.K. Sen et al.(2008) There is positive association between human capital formation especially expenditure on education and health and economic growth in Tamilnadu. However, there is uneven distribution of human capital expenditure across the districts in Tamilnadu. Thangamayan and Premlatha (2021) pointed out in their research that increase in the public expenditure increase health and education outcomes in Tamilnadu.

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K. Kajisa & Venkatesa Palanisamy (2006) revealed in their studies that human capital formation facilitated structural transformation and generated more non-form employment opportunities in Tamilnadu. Tamilnadu government stated that improvement in higher education infrastructure, vocational training, skills of work force, women's participation and industrial linkage play a major role in accelerating economic growth and development in Tamilnadu. (Tamilnadu Vision \$1 Trillion, 2024) Chetan Ghate et al.(2014) concluded in their studies that public and private investment influences human capital formations which inturn complement growth of public and private investment.

Theoretical Framework

The modern economic theories showcased the significance of human capital formation in economic development of a country. Gary Becker and Schultz have given theoretical framework for the concepts of human capital formations. Schultz pointed out that investment in people especially education and training is pertinent for economic growth and development. Jacob Mincer's work is also appreciated in this field. Infact, Adamsmith's Wealth of Nation provided foundation for the development of human capital formation concept. Most of the theories related to human capital formation stated that there is positive association between investment in people especially on health, education, skill development, training programe, and economic growth.

Trends of Government expenditures and Gross Domestic State Product in Tamilnadu

Year	Expenditure on health on revenue account in crores	Expenditure on education on total expenditure In cr.	Expenditure On social infrastructure Rs. In crores	GSDP of Tamilnadu in crores
	X1	X2	X3	Y
2015	6263.3	28198.64	55197.9	1176500
2016	6867.0	30639.06	62757.9	1302639
2017	7443.6	36260	70057.8	1465051
2018	8012.0	40485	69689.3	1630209
2019	8636.6	43361	71792.6	1743144
2020	9229.8	44021	86228.6	1788074
2021	69234 cr.	43758	86392	2072496
2022	76902 cr.	45344	107549.6	2372469
2023	89251 cr.	44,661	114967.8	2688963
2024	89155 cr.	51,487	118871	3155096
2025	94371 cr.	56513	137647.7	3567800

Source: Compiled from various issues of Tamilnadu -An Economic Appraisal and Budget Reports.\

To justify the objectives multiple regression analysis was used and the results are given in the following paragraphs.

The model estimated was:

$[Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \text{varepsilon}]$ Where:

- X_1 = First explanatory variable - Expenditure on health
- X_2 = Second explanatory variable - Expenditure on education

- X3 = Third explanatory variable -Social infrastructure
- Y = Dependent variable – Gross State Domestic Product

Regression Output (Summary)

(This is directly taken from the statistical computation)

OLS Regression Results

Dep. Variable:	Y	R-squared:	0.999
Model:	OLS	Adj. R-squared:	0.999
Method:	Least Squares	F-statistic:	6.441e+03
Date:	Mon, 17 Feb 2025	Prob (F-statistic):	1.59e-10
Time:	10:33:14	Log-Likelihood:	-126.68
No. Observations:	11	AIC:	261.4
Df Residuals:	7	BIC:	263.5
Df Model:	3		
Covariance Type:	nonrobust		

coef std err t P>|t| [0.025 0.975]

const	-2.483e+05	3.77e+04	-6.586	0.000	-3.34e+05	-1.63e+05	X1	10.7798
	0.553	19.507	0.000	9.466	12.094			
X2	-1.9974	0.726	-2.750	0.028	-3.732	-0.263		
X3	18.7945	0.721	26.083	0.000	16.938	20.651		

Omnibus:	0.270	Durbin-Watson:	1.897
Prob(Omnibus):	0.873	Jarque-Bera (JB):	0.474
Skew:	0.211	Prob(JB):	0.789
Kurtosis:	2.035	Cond. No.....	1.16e+05

Major Findings and Discussion

1. Model Fit

- **R² = 0.999** → The model explains **99.9%** of variation in Y.
- **F-statistic is very high and significant (p < 0.001)** → The model is statistically strong. This indicates an **extremely good fit**.

2. Significance of Independent Variables

Variable	Coefficient	P-value	Interpretation
X1	+10.78	0.000	Strong positive & significant
X2	-1.99	0.028	Significant but negative influence
X3	+18.79	0.000	Strong positive & highly significant

Interpretation:

X1 has a strong positive impact on Y

For every **1 unit increase in X1**, Y increases by **10.78 units**, holding other variables constant.

X2 has a negative effect

For each **1 unit increase in X2**, Y decreases by **1.99 units**. This suggests X2 may represent a component that:

- moves counter to Y, or
- overlaps with X3 → possible **multicollinearity**.

X3 has the strongest positive impact

For every **1 unit increase in X3**, Y increases by **18.79 units**. This is the **most influential predictor**.

3. Multicollinearity Warning

The very high **Condition Number** (1.16×10^5) indicates: X1, X2, X3 are likely **highly correlated with each other**

→ Could distort the coefficients (especially X2's negative sign). A VIF test is recommended if you want deeper diagnostics.

4. Final Regression Equation

$$[\hat{Y} = -248300 + 10.78(X1) - 1.99(X2) + 18.79(X3)]$$

5. Overall Interpretation

- **X1 and X3 strongly and positively drive Y.**
- **X3 is the dominant predictor.**
- **X2 has a statistically significant but negative impact**, possibly due to multicollinearity.
- The model as a whole predicts Y extremely well (**99.9% accuracy**).

The analysis reveals that there is very association between expenditure on education and social infrastructure. The policy implication of the study is that the government should spend more on education and social infrastructure.

1. Graphs Provided

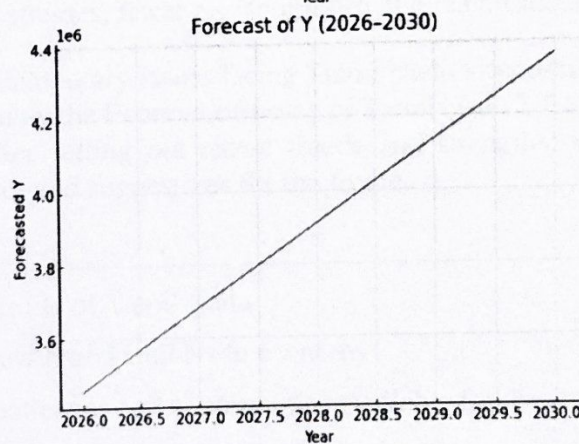
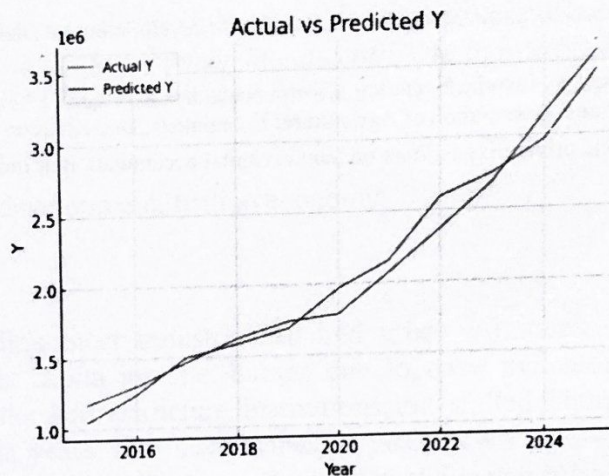
Two charts have been generated:

A. Actual vs Predicted Y (2015–2025)

Shows how well the regression model fits your actual data.

B. Forecast of Y (2026–2030)

Based on a linear trend generated from the regression-predicted values.



3. Forecast Values (2026–2030)

Using the regression-derived trend, here are the forecasted Y values:

Year	Forecast Y
2026	3,455,230
2027	3,683,186
2028	3,911,142
2029	4,139,098
2030	4,367,053

These forecasts show a **steady upward trend**, consistent with earlier years.

Conclusion

According to the analysis made in this article with the given data one can suggest that the government of Tamilnadu may spend more money on education and social infrastructure as there are very strong positive association and correlation between expenditure on education and social infrastructure. It is also suggesting that the expenditure on health should be monitored and spend the same more efficiently and effectively so as to improve the quality of the human capital.

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