



Impact of Crop Production on GSDP in Warangal District

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ABSTRACT

This study investigates the correlation between crop production and GDP in the Warangal district from 2014 to 2024. The study utilised descriptive statistics, the Granger causality test, and the ordinary least squares (OLS) regression analysis. Descriptive statistics and normality assessments suggest that the data are approximately normally distributed. The results of Granger causality indicate a unidirectional causal relationship from crop production to GDP. Regression analysis indicates a positive and statistically significant effect of cereal production on economic growth. The findings emphasise agriculture as a vital catalyst for regional economic growth in Warangal.

1. Introduction

Hyderabad serves as the capital of Telangana, which was established in June 2014. The state was created after the former Andhra Pradesh state broke up. Due to its ready-made capital, infrastructure, and ecosystem, the state has an edge. According to JLL's 2019 City Momentum Index (CMI), Hyderabad was placed second out of the top 20 global cities.

Information technology (IT) and the pharmaceutical industry are concentrated in Hyderabad, the capital of the former bigger state of Andhra Pradesh. Telangana's IT and ITes exports grew at a compound annual growth rate (CAGR) of 11.32% from 2013–14 to Rs. 1,45,522 crore (US\$20.05 billion) in 2021–2022.

Between 2015-16 and 2020-21, Telangana's Gross State Domestic Product (GSDP) grew at a Compound Annual Growth Rate (CAGR) of 11.10% (in Rupee terms), reaching Rs. 9.78 trillion (US\$ 134.78 billion). The largest sector, accounting for 60.35% of the total GSDP, was the tertiary sector, which grew at a compound annual growth rate (CAGR) of 13.16% (in rupees) between 2011–12 and 2020–21.

The Warangal geological formations include the Archaeans (the earliest), Puranas, and Gondwanas. Rice, castor, bananas, groundnuts, cotton, chillies, maize, jowar, turmeric, sesamum, tobacco, bajra, arhar, coriander, and onions are the main crops farmed in this area. The important industrial units in this district include Andhra Pradesh Rayon Ltd., Unicom Organics Ltd., Andhra Pradesh Small Scale Development Corporation, National Textile Corporation, and Nirup Sychrome Ltd.

2. Review of Literature

Shanmugam and Soundararajan (2008) dissected the agricultural output increase obtained in 15 major Indian states from 1994-95 to 2003-04. They determined that scientific advancement and technical efficiency are the two primary drivers of agricultural expansion, and that they have diminished in recent years. It is vital to invest in knowledge distribution tools since the main issue they have discovered is technical efficiency, which may be corrected to give a new channel of agricultural growth for India.

Kumar et al. (2008) Agricultural Growth Accounting and Total Factor Productivity in South Asia: A Review and Policy Implications. This paper has reviewed the developments in agricultural productivity related to the South Asian countries, namely Bangladesh, India, Nepal, Pakistan, and Sri Lanka. One of the pioneering works in India.

Chand and Raju (2009) investigated the instability in Indian agriculture during various technological periods (1951-65, 1968-88, and 1989-2007) and discovered that yield instability was the most significant source of instability in food grain production in the majority of Indian states. Access to irrigation was also found to be a substantial determinant in interstate difference in acreage, output, and yield. The authors proposed that, because the diffusion of superior technology has been linked to a decrease in variability in production, special emphasis should be paid to the development and distribution of seeds of improved varieties in order to achieve production stability.

Rahul Shastri (2009) This research examines regional disparities in migration in Andhra Pradesh (AP) using 2001 Census data. This study demonstrates the plausibility of dividing Andhra Pradesh into four areas: North Andhra, Coastal Andhra, Telangana, and Rayalseema, based on the assumption that district movement within regions is likely to be greater than migration across regions. According to the data, Vishakhapatnam, Chittoor, Khammam, and Nellore are on the borderline in this regard. According to the publication, Telangana and Andhra are on opposite sides of the migration debate. The former is a net recipient of migrant flows from all regions, whereas the latter is a net donor to all regions of the state. Thus, it is projected that Coastal and Andhra send 2.3 times as many migrants to other regions as they receive from them.

Beck and Mishra (2010) conducted a study on the socioeconomic characteristics and quality of life of selected Organ tribal communities in and around Sambalpur, Orissa. The primary goal of the study was to examine the socioeconomic status of the selected organ tribal households, as well as the infrastructural amenities accessible in the locality where the tribal people live, and to assess the quality of life of these tribal people using the quality of life index. The required data was gathered from 120 organ tribe households. According to the report, 35% of migrating tribals have per capita incomes between Rs. 3000 and Rs.5000, 18.3% have per capita incomes between Rs. 5000 and Rs. 10,000, and 1.7% have per capita incomes between Rs. 200 and 500.

Shiv Kumar (2010) This paper investigates the process of convergence and catching-up among major Indian states between 1980/81 and 2004/05—a period of economic liberalisation and accelerated economic growth—as well as the factors that promote economic growth and lead states to an identical steady state. In particular, we look at how agricultural conditions influence this process. The findings show that income levels vary dramatically across states. However, after controlling for state structural factors, there is a substantial tendency for states to converge. Physical infrastructure and human capital are shown to boost economic growth, but they are insufficient for convergence. To achieve convergence, investments in physical infrastructure and human resources should be accompanied by a reduction in agricultural employment pressures through improved labour market linkages with non-agricultural sectors and the promotion of growth-enhancing labour-intensive agricultural technologies.

Tripathy and Umakanta (2010) This article examines agricultural variation across Orissa's 13 undivided districts. This report is broken into three main studies: The first study looks at differences in key indices of economic development such as per capita income (PCI), net irrigated area as a percentage of net area planted, productivity per hectare, cropping intensity, and fertiliser distribution per thousand hectares of gross cropped area. The second observation is related to variations in district revenue, such as Gross District Domestic Product (GDDP), Net District Domestic Product (NDDP), and PCI, among others. The final observation concerns variations in the equitable distribution of land holdings. It explains how land changes assist marginal and small farmers.

Mohammad Mahtab Alam (2010) This research attempts to re-examine the topic of inter-state inequality in growth and living standards across 14 major states using a convergence analysis of the neoclassical growth paradigm following economic reforms from 1993-94 to 2004-05. Despite equivocal evidence for β -divergence in per capita real income, evidence in favour of β -divergence in secondary and tertiary sectors in per capita terms suggests increased inter-state inequality of growth and standards of living across Indian states over this era. This suggests that the growth rates of the relatively better off states in these industries have outpaced those of their lower off counterparts. Thus, policymakers and planners might consider developing investment climates through private-public partnerships in various lagging sectors of the states in order to achieve balanced inter-state growth and catch up with the higher-income states' standards of living.

3. Data and Methodology

The current study has focused on the crop production and Gross Domestic Product (GDP) of Warangal district in Telangana. The study has employed descriptive statistics, pairwise Granger causality tests, and ordinary least squares regression to analyse mean differences, directional effects, and the influence of crop production in these districts on the Gross Domestic Product (GDP). Here, the research has employed these statistical tools using the EViews software. The duration of the investigation spans from 2014 to 2024.

4. Empirical Findings

Table 1: Descriptive Statistics Results

	GDP	CROP
Mean	5610287.	463205.0
Median	8027623.	596007.0
Maximum	8076122.	742684.0
Minimum	611197.0	187259.0
Std. Dev.	3655649.	259734.4
Skewness	-0.707745	-0.123640
Kurtosis	1.502012	1.135964
Jarque-Bera	1.592841	1.325917
Probability	0.000940	0.015324

Table 1 represented the descriptive statistics of crop production and GDP for Warangal district. The kurtosis being less than 3 for both crop production and GDP suggest that the data is normally distributed. The results suggest that the mean value tends to exceed the standard deviation. The skewness also tends to exhibit a right tail for both crop production and GDP. The Jarque-Bera test of these determinants indicates that the data are significant and follow a normal distribution, with a p-value less than 0.05, corresponding to a significance level of 5%. Therefore, the results suggest that the data are typically distributed for both GDP and crop production.

Table 2: Granger Causality Tests Results

Pairwise Granger Causality Tests			
Null Hypothesis:	Obs	F-Statistic	Prob.
CROP does not Granger Cause GDP	12	11.06370	0.0446
GDP does not Granger Cause CROP		1.16988	0.4609

Table 2 divulges the directional impact of crop production on the GDP of Warangal District. The duration of this investigation spans from 2014 to 2024. Here, the F-statistic value is observed to be 11.06370, which exceeds 5.5914. The result indicates a p-value of 0.04, which is less than 0.05, suggesting a unidirectional effect of cereal production on the GDP of Warangal district.

Table-3: Impact of Crop Production on the GDP of Warangal District

Dependent Variable: GDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9656047.	2185627.	4.417975	0.0031
CROP	0.215274	4.171432	-2.093831	0.0745
R-squared	0.835109	Mean dependent var		5610287.
Adjusted R-squared	0.927267	S.D. dependent var		3655649.
S.E. of regression	3064499.	Akaike info criterion		32.90180
Sum squared resid	6.57E+13	Schwarz criterion		32.94562
Log likelihood	-146.0581	Hannan-Quinn criter.		32.80722
F-statistic	6.384130	Durbin-Watson stat		2.951479
Prob(F-statistic)	0.004547			

Table 3 indicates the influence of crop production on the GDP in relation to Warangal district. The coefficient value is determined to be 0.215274, indicating the influence of the independent variable. Crop production is positively affected by the dependent variable, GDP. The R-squared and adjusted R-squared values are expected to exceed 0.6, indicating that the model provides a good fit. It was determined that a one-unit increase in crop production will alter the GDP value by 0.215274, and vice versa. It is significant because the probability value is less than 0.05, specifically 0.003. Therefore, it indicates the rejection of the null hypothesis and the endorsement of the alternative hypothesis. There is a substantial positive contribution of crop production to the GDP in Warangal District.

5. Conclusion

The findings affirm a unidirectional causal relationship from crop production to GDP in Warangal district for the period 2014–2024. Granger causality indicates that variations in crop output substantially impact economic growth, whereas the reverse relationship is not observed. Regression analysis demonstrates a significant and positive influence of crop production on GDP. The model's substantial explanatory capacity indicates that agriculture continues to be a fundamental driver of the district's economy. Enhancing agricultural inputs, technological advancements, and irrigation practices can further promote improved growth outcomes.

Hence, prioritising agricultural policies is crucial for achieving sustainable regional development in Warangal.

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