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Diverging trends in banana prices and market arrivals: A case study of Ravulapalem Regulated Market, Andhra Pradesh

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Abstract

India is one of the largest producers of bananas with Andhra Pradesh contributing significantly to national output. The Ravulapalem regulated market often referred to as the “Banana Capital of Andhra Pradesh,” plays a crucial role in banana trade and farmer livelihoods. However, recent years have shown contrasting trends in arrivals and prices indicating possible supply-demand imbalances. The present study analyzes the long-term trends in banana arrivals and prices in the Ravulapalem market during 2013–14 to 2023–24 using secondary data from APMC records. Analytical tools such as the Compound Annual Growth Rate (CAGR) and Simple Linear Regression were employed to assess growth patterns and trend significance.

Results revealed a significant decline in banana arrivals from 68.43 lakh bunches in 2013–14 to 37.41 lakh bunches in 2023–24, with a negative CAGR of –6.62%. In contrast, average prices rose from ₹161 to ₹325 per bunch, showing a positive CAGR of +7.13%. Regression analysis confirmed a downward trend in arrivals and a strong upward trend in prices. The study concludes that declining production and limited supply have contributed to sustained price increases. Strengthening post-harvest infrastructure, production stability and market intelligence systems is vital to ensure balanced banana marketing and income security for farmers.

Keywords: Banana marketing, Ravulapalem regulated market, Compound Annual Growth Rate (CAGR), price trend analysis, market arrivals

Introduction

India, with its diverse climatic and agro-ecological conditions is one of the world’s leading producers of fruits among which banana holds a prominent place. Banana *Musa paradisiaca* L. is the second most important fruit crop after mango, contributing significantly to the nutritional, economic and cultural dimensions of the country. India accounts for nearly one-third of the world’s banana production with states like Maharashtra, Tamil Nadu, Andhra Pradesh and Gujarat being the major producers.

In Andhra Pradesh, banana cultivation forms a vital component of the horticultural sector, supporting farmer livelihoods and contributing substantially to the state economy. Within the state, the Ravulapalem regulated market in Dr. B.R. Ambedkar Konaseema district has earned the reputation of being the “Banana Capital of Andhra Pradesh,” due to its large-scale arrivals, active trading and interstate linkages. A wide range of varieties including Karpooora, Chakrakeli and Amruthapani are marketed here catering to consumer demand both within and

outside the state.

Despite its significance, the Ravulapalem market has witnessed diverging trends in arrivals and prices in recent years. On one hand, banana arrivals have shown signs of decline due to factors such as reduced cultivation area, pest incidence and climatic stress. On the other hand, market prices have consistently moved upward, reflecting growing consumer demand and limited supply. This divergence highlights structural imbalances in the supply chain with implications for both farmer income stability and consumer affordability.

Materials and Methods

The study was conducted at the Ravulapalem regulated market under APMC Kothapeta, Dr. B.R. Ambedkar Konaseema district, Andhra Pradesh. Secondary data on monthly banana arrivals and average prices from 2013–2014 to 2023–2024 were obtained from APMC records. The Compound Annual Growth Rate (CAGR) was computed using an exponential growth model to measure long-term

changes in arrivals and prices. Simple linear regression was applied to analyze trends with prices and arrivals as dependent variables and time as the independent variable. The statistical significance of growth rates was tested using t-values. This approach enabled an assessment of both overall market behavior and monthly fluctuations in banana trade over the 11-year study period.

Statistical tools and techniques

To fulfil the objectives of the study systematically and derive valid conclusions from the collected data, appropriate statistical and econometric tools were employed. The following analytical methods were used to interpret, quantify and present the results of the investigation effectively.

Compounded annual growth rate

The Compound annual growth rate (CAGR) is a widely used tool to measure the average annual rate of growth of a variable over a given time period, assuming compounding effects. In this study CAGR was employed to examine the trend in banana arrivals and price movement in the Ravulapalem regulated market over the last 11 years i.e. 2013-2014 to 2023-2024. This method smoothen out year-to-year fluctuations and provides a consistent growth estimate.

Growth rate analysis was undertaken with a view to study the changes in arrival and prices of banana. An exponential growth model to estimate CAGR

$$Y = ab^t$$

Where,

Y = Arrival or price in year t

a = Intercept (initial constant)

b = Growth coefficient

t = time (in years)

The equation is non-linear, so it's linearized by taking log on both sides

$$\log Y = \log a + t \log b$$

$\log Y$ = Dependent variable

t = Independent variable

The slope $\log 'b'$ is estimated and then CAGR is derived from b

Trend analysis using simple linear regression

Simple linear regression is a widely used statistical method for identifying and measuring trends over time. In this study, it is used to assess the trend in arrivals and prices of bananas in the Ravulapalem regulated market by fitting a straight-line equation to the time series data.

The trend equation used for the purpose is of the form.

$$Y = a + bX$$

Where,

Y = Dependent variable (e.g: arrival or prices over a period of time)

X = Independent variable (time in years)

a = intercept (value of Y when X= 0)

b = slope coefficient (represents the annual change or growth trend).

Results and Discussion

The analysis of banana arrivals and prices in the Ravulapalem regulated market during the period 2013–14 to 2023–24 revealed distinct trends in both variables over time.

Banana arrivals

Banana arrivals in the market exhibited a continuous declining trend throughout the study period. The total arrivals fell from 68.43 lakh bunches in 2013–14 to 37.41 lakh bunches in 2023–24 showing an overall reduction of about 53 percent. The Compound annual growth rate (CAGR) of arrivals was estimated at –6.62 percent which was found to be statistically significant at both 1 and 5 percent levels (t = –9.23).

The simple linear regression equation for arrivals was obtained as:

$$Y_t = 558449 - 2296t$$

with an R^2 value of 0.54, indicating that about 54 percent of the variation in arrivals is explained by the time factor. This suggests that banana arrivals decreased by nearly 2,296 bunches per month in the Ravulapalem market.

Table 1: Arrivals and prices in the Ravulapalem banana regulated market (2013–14 to 2023–24)

Year	Arrivals (bunches)	Price (Rs/bunch)
2013–14	68,43,265	161
2014–15	67,65,375	183
2015–16	55,85,560	188
2016–17	53,44,056	207
2017–18	52,71,553	227
2018–19	47,76,196	248
2019–20	40,32,696	263
2020–21	36,54,746	267
2021–22	36,53,924	290
2022–23	38,87,941	310
2023–24	37,41,884	325

Table 2: Growth rate of arrivals and prices of banana in ravulapalem regulated market (2013–14 to 2023–24)

Parameter	CAGR (%)	t-value
Prices	+7.13**	(24.38)
Arrivals	–6.62**	(–9.23)

Note:

1. ** = significant at 1% and 5% levels
2. Figures in parentheses indicate t-values.

Table 3: Results from regression analysis of monthly arrivals in Ravulapalem regulated market

Parameter	Value
Equation of trend line	$Y_t = 558449 - 2296t$
R-Square (R^2)	0.54
t-value (for slope)	–12.34
Intercept (a)	558449
Slope (b)	–2296

The results indicate a statistically significant negative

growth in banana arrivals, confirming a long-term declining trend.

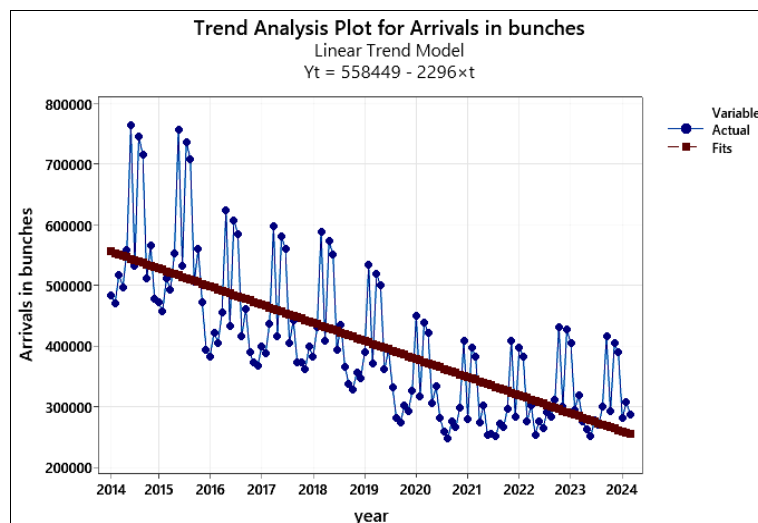


Fig 7: Graph showing the trend analysis for arrivals over a period of 11 years (2013- 2014 to 2023-2024).

Banana prices

In contrast, banana prices in the Ravulapalem market showed a strong positive trend. The average price increased from ₹161 per bunch in 2013–14 to ₹325 per bunch in 2023–24, reflecting a 101.86 percent increase over the study period. The CAGR of prices was found to be +7.13 percent, which was statistically significant at the 1 percent level ($t = 24.38$).

The regression model for prices was derived as:

$$Y_t = 153.30 + 1.3466t$$

with an R^2 value of 0.97, suggesting that 97 percent of the variation in prices can be explained by time. This indicates a consistent and significant monthly price increase of approximately ₹1.35 per bunch.

Table 4: Results from regression analysis of monthly prices in ravulapalem regulated market

Parameter	Value
Equation of trend line	$Y_t = 153.30 + 1.3466t$
R-Square (R^2)	0.97
t-value (for slope)	68.60**
Intercept (a)	153.30

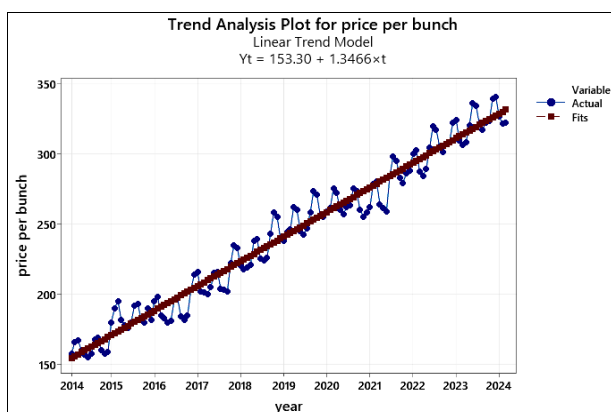


Fig 6: Graph showing the trend analysis for prices over a period of 11 years (2013- 2014 to 2023-2024).

Overall, the results show that while arrivals have declined substantially, prices have increased steadily, suggesting a supply-demand imbalance in the Ravulapalem banana market during the decade under study.

Discussion

The significant decline in arrivals indicates possible challenges in banana production such as reduced cultivation area, pest incidence, climatic stress and rising input costs. This consistent reduction in supply has directly contributed to the observed price escalation.

The sharp increase in prices despite declining arrivals suggests that consumer demand for bananas has remained steady or even increased. The market's dependence on limited arrivals to meet demand has resulted in higher price volatility and reduced affordability for consumers while farmers face uncertainty in income due to inconsistent production levels.

These findings are consistent with earlier studies on agricultural commodities such as onion and groundnut by Beniwal *et al.* (2022) ^[1] and Kumarasamy *et al.* (2022) ^[5], which also reported that falling arrivals were accompanied by increasing price trends. Similar observations by Shankar *et al.* (2023) ^[7] on onion markets highlight the importance of time-series monitoring for perishable commodities.

Therefore, ensuring production stability, improving post-harvest handling and storage facilities, and strengthening market intelligence and forecasting systems are crucial to stabilize both arrivals and prices. Policy interventions focusing on supply chain efficiency and price stabilization mechanisms can help protect farmer incomes and maintain market equilibrium in the ravulapalem banana sector.

Interpretation

The study confirms a supply-demand imbalance: arrivals consistently declined while prices surged leading to instability in farmer incomes and consumer affordability. The findings are in line with studies on onion and groundnut markets (Beniwal *et al.*, 2022; Kumarasamy *et al.*, 2022) ^[1, 5], where declining arrivals coincided with rising prices.

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