

Relationship between Prices and Market arrivals of Gram in Madhya Pradesh

Abstract

Taking these aspects into consideration current investigation was performed by acquiring monthly wholesale prices of gram in Madhya Pradesh. This analysis was centred on the secondary data regarding relationship between prices and market arrivals of gram in designated Agricultural Produce Market Committee (A.P.M.Cs) of Madhya Pradesh during the span of a decades from 2012-13 to 2021-22. Maximum significant association between prices and arrivals was seen in Vidisha *mandi* during eight years (2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18, 2020-21 and 2021-22) while it was non-significant only in two years in Vidisha *mandi* (2018-19 & 2019-20). Followed by Raisen and Bhopal mandies during six years. Only in Vidisha and Bhopal *mandi* the correlation between arrivals and price showed a negative relationship (-0.2330 and -0.0327) and was statistically significant while it was statistically non-significant in Raisen *mandi*. Market arrivals were maximum in Vidisha *mandi* along side monthly average of 1563.04 qt and minimum in Bhopal with the mean of 22.67 quintal per month. Coefficient of variation was computed to study the variations in monthly prices and arrivals gram during 2012-13 to 2021-22. Price variability coefficient of gram was originally peak (49.41%) in Vidisha, followed by (23.51%) Raisen and Bhopal (19.37%) from 2012-13 to 2021-22. The highest variation in arrivals was in Vidisha (49.41%) followed by Bhopal (44.73%) and Raisen (40.93%).

Key words: Prices, arrivals, mean, variations, APMCs, correlation etc.

Introduction

Gram is versatile in its culinary applications, providing significant nutritional value. Gram soup, renowned for its nourishing properties, contributes to the recovery process from spleen and liver disorders. Besan, a flour made from pulses, is utilized in the preparation of sweets, snacks, and namkeen. It can also be consumed fried, boiled, or salted. India holds the title of being the leading producer and consumer of pulses globally. Pulse cultivation inside India spans an average of approximately 23 million hectares. Over time, the cultivation of pulses in India has shifted towards marginal lands and rainfed areas. The main pulse cultivation areas are predominantly located in Madhya Pradesh (21%), Maharashtra (14%), Rajasthan (17%), Uttar Pradesh (10%), Karnataka (9%), Andhra Pradesh (8%), Chhattisgarh (4%), Bihar (3%), and Tamil Nadu (3%). Together, these states account for 80% of the overall pulse production (Yadav et.al 2017). Madhya Pradesh was the first major producer of pulses, which accounted 21.78 per cent shared of total production in India. Gram was very imperative pulse crop of the state occupying 2.03 million of hectares area with output of 3.03 millions of tonnes with an average yield of 1495 kilograms per hectare (Agriculture Statistics at a Glance 2022). The cultivation of these crops is mainly concentrated in arid and semi-arid regions, including dry and semi-dry districts Vidisha, Raisen, Rajgarh, Dewas, Panna, Jabalpur, Guna, Sehore, Ujjain, Damoh and Sagar. Extensive variations have been noted in both the acreage

and yield of pulse crops in the significant pulse production in Madhya Pradesh is largely influenced by changes in weather and climatic conditions. Favorable weather years typically result in a doubling of pulse production, leading to market saturation and a subsequent decrease in pulse prices. To address this issue and mitigate the fluctuations in agricultural product prices while also increasing market arrivals, it is essential to devise suitable strategies and measures. Yearly, there was considerable variability in prices and arrivals, posing challenges for farmers or traders in ensuring consistent profits from storage. Marketing holds significant importance in economic development as it serves to stimulate production and minimize unnecessary fluctuations in output and prices. The experiences of various countries highlight that without an efficient marketing system, strategies for agricultural development may struggle to effectively boost production. Understanding price behavior, including price levels, trends, and fluctuations, is crucial for determining the competitiveness of commodities both domestically and internationally. This information helps in forecasting future prices and formulating long-term trade strategies (Sharma Shirish, 2014).

Objectives

To analyze how market arrivals of gram correspond to price variations across diverse markets in Madhya Pradesh.

Research Methodology

The study focused exclusively on Madhya Pradesh, specifically gathering secondary data on market arrivals and monthly gram prices spanning a decade from 2012-13 to 2021-22. This data was sourced from the Directorate of Economics and Statistics, Government of Madhya Pradesh in Bhopal, as well as from selected mandi offices and AGMARKNET (<https://agmarknet.gov.in>). The selection of major crops for detailed investigation was based on Madhya Pradesh's production ranking compared to the national level. Gram was purposefully chosen for in-depth analysis. Vidisha and Raisen districts were selected for gram based on their production ranking within Madhya Pradesh. Bhopal district, with its prominent mandies, was also chosen for comparative analysis. Vidisha and Raisen mandies were selected due to their high arrival rates, while Bhopal grain market was selected for its status as the largest APMC in Madhya Pradesh, facilitating a comparative assessment of prices and arrivals.

Analysis of Data

Relationship between prices and market arrivals of selected agricultural commodities

This objective was split into two components, specifically: Correlation coefficient and coefficient of variation.

- I. The correlation coefficient was calculated to assess the nature and strength of the relationship between arrivals and prices of the chosen commodities in the market.
- II. The coefficient of variation was utilized to analyze the variability in arrivals and prices of selected agricultural commodities within the study region throughout the years.

1. Correlation:

Correlation serves as a measure of the strength or extent of the linear relationship between two variables (price and arrivals) for "n" pairs of observations. To ascertain the direction and magnitude of the association between arrivals and prices, the following formula was utilized to compute the correlation coefficient (r):

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2(Y_i - \bar{Y})^2}}$$

Here,

r = Correlation coefficient

X_i = Amount of selected commodity arrivals i^{th} month/year (in quintals).

\bar{X} = Mean amount of arrivals of the chosen commodity (in quintals).

Y_i = Price of the selected commodity in the i^{th} month/year (expressed in Rs. per quintal).

\bar{Y} = The average price of the selected commodity (measured in Rs. per quintal).

n = Count of observations.

2. Coefficient of variation (CV)

The coefficient of variation (CV) serves as a relative gauge of variability, illustrating the magnitude of standard deviation relative to its mean. This standardized, dimensionless measure enables comparison of variability across different groups and attributes. Also referred to as the relative standard deviation (RSD), it was calculated to determine the degree of fluctuations in market arrivals and prices of selected commodities within the study market.

$$CV = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

Result and discussion

Correlation between prices and market arrivals

Year wise correlation among monthly prices and arrivals in Bhopal, Raisen & Vidisha mandies as shown in table-1 shows negative and statistically significant association for most of the years in gram. Maximum significant correlation between prices and arrivals was seen in Vidisha *mandi* during eight years (2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18, 2020-21 and 2021-22) while it was non-significant only in two years in Vidisha *mandi* (2018-19 & 2019-20). Followed by Raisen and Bhopal mandies during six years. Shukla and Rai (2014) obtained comparable findings in onion, garlic, and turmeric within chosen markets of Uttar Pradesh.

Table 1: Relationship between gram prices and arrivals in selected mandis of Madhya Pradesh spanning from 2012-13 to 2021-22

Years	Raisen	Vidisha	Bhopal
2012-13	-0.411**	0.502**	-0.279*
2013-14	-0.144*	0.391*	0.519**
2014-15	-0.668**	0.502*	-0.187 ^{NS}
2015-16	-0.149 ^{NS}	-0.565**	-0.577**
2016-17	-0.668*	-0.654*	-0.911*
2017-18	0.273 ^{NS}	-0.064*	-0.342 ^{NS}
2018-19	-0.149 ^{NS}	-0.295 ^{NS}	0.011 ^{NS}

2019-20	0.275**	-0.003 ^{NS}	-0.187*
2020-21	-0.144*	0.391**	0.519**
2021-22	0.490 ^{NS}	0.502**	0.519 ^{NS}

** Statistical significance with a 1% probability

* Statistical significance with a 5% probability

^{NS} not significant

The results of correlation investigation on monthly prices and arrivals of gram during years (2012-13 to 2021-22) as shown in table 2 shows that only in Vidisha and Bhopal *mandies* the relationship among arrivals and price was negative (-0.2330 and -0.0327) and statistically significant, whereas it was statistically non-significant in Raisen *mandi*. Sharma and Singh (2014) encountered comparable outcomes, showing that the association between prices and arrivals was negative and statistically insignificant in the Jaipur and Nagaur markets for pearl millet, whereas it was positive and statistically significant in the Jodhpur market.

Table 2: Correlation between prices and arrivals of gram in selected *mandies* of MP during 2012-13 to 2021-22

	Raisen	Vidisha	Bhopal
Correlation	-0.0847 ^{NS}	-0.2330**	-0.0327*

** Statistical significance at the 1% level

* Statistical significance at the 5% level

^{NS} not significant

2. Variability in gram arrivals and prices

The fluctuation in arrivals and prices of gram within Bhopal, Raisen & Vidisha *mandies* during year (2012-13 to 2021-22) was investigated as well as illustrated in Table 3. Findings discovered that the market arrivals were maximum in Vidisha *mandi* alongside a monthly average of 1563.04 qt and minimum Bhopal with the mean of 22.67 quintal per month. Standard deviations indicate the extent of dispersion around the mean. For arrivals, Raisen had a standard deviation of 46.53 quintals, Vidisha had 772.38 quintals, and Bhopal had 10.11 quintals. The coefficient of variation was calculated to examine the fluctuations in monthly prices and arrivals of gram from 2012-13 to 2021-22. The coefficient of variations in prices of gram was originally to the maximum in (49.41%) Vidisha, followed by (23.51%) Raisen and Bhopal (19.37%) during the period from 2012-13 to 2021-22. The highest variation in arrivals was in Vidisha (49.41%) followed by Bhopal (44.73%) and Raisen (40.93%). It can be understood that in Vidisha *mandi* maximum variations in arrivals and prices were found. Similar results were obtained by Deokate *et al.* (2020).

Table 3: Statistical overview of gram prices and arrivals in selected markets of Madhya Pradesh spanning from 2012-13 to 2021-22

Parameters	Raisen		Vidisha		Bhopal	
Mean (monthly)	Arrivals (q)	Prices (₹/q)	Arrivals (q)	Prices (₹/q)	Arrivals (q)	Prices (₹/q)
	113.691	4438.6588	1563.0413	1563.0413	22.6776	4423.5870
Standard Deviation	46.5356	1043.5805	772.3858	772.3858	10.1142	856.9091
Coefficient of Variation (Per cent)	40.9314	23.5112	49.4156	49.4156	44.73	19.3714

Summary and Conclusions

Maximum significant association between prices and arrivals was seen in Vidisha *mandi* during eight years (2012-13, 2013-14, 2014-15, 2015-16, 2016-17, 2017-18, 2020-21 and 2021-22) while it was non-significant only in two years in Vidisha *mandi* (2018-19 & 2019-20). Followed by Raisen and Bhopal mandies during six years. The results of correlation analysis on monthly prices and arrivals of gram during years (2012-13 to 2021-22) that only in Vidisha and Bhopal *mandi* the relationship between arrivals and price exhibited a negative correlation (-0.2330 & -0.0327) and was statistically significant while it was statistically non-significant in Raisen *mandi*. Market arrivals were highest in Vidisha *mandi* alongside a monthly mean of 1563.04 quintals and lowest in the Bhopal with the mean of 22.67 quintal per month. The coefficient of variation was determined to analyze the fluctuations in monthly prices and arrivals gram during 2012-13 to 2021-22. Price variability coefficient gram was found to be maximum (49.41%) Vidisha, followed by (23.51%) Raisen and Bhopal (19.37%) during the period from 2012-13 to 2021-22.

Policy Implications

Taking into account the results above, the following strategies are recommended:

- 1. Market Monitoring and Information Dissemination:** Continuous monitoring of arrivals and prices in *mandies* can help farmers, traders and legislators make informed decisions about when to vend or purchase gram crop. Timely dissemination of market information can lead to better price realization and improved market efficiency.
- 2. Storage and Warehousing Facilities:** Considering the deviations in arrivals and prices there is a necessity to develop adequate storage and warehousing infrastructure. This can assistance manage the supply-demand imbalances, reduce wastage and stabilize prices during period of high and low arrivals.
- 3. Market Diversification:** Policymakers could explore ways to encourage farmers in other *mandies* to differentiate their market channels and consider selling their products in other markets. This could potentially lead to increased competition among buyers, resulting in better prices for farmers.
- 4. Price Stability Measures:** Considering the higher variability in prices, policymakers may consider implementing price stability measures. This can involve interventions such as price

support programs, futures contracts, or hedging mechanisms to stabilize prices and defend farmers from sudden price fluctuations.

5. **Risk Management Tools:** Considering the variability in both prices and arrivals, policymakers should promote the practice of risk management tools among farmers. This can include encouraging farmers to adopt crop insurance schemes and explore agricultural futures markets to hedge against price and production risks. Providing training and education on risk management plans can help farmers mitigate losses and enhance their overall profitability.

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