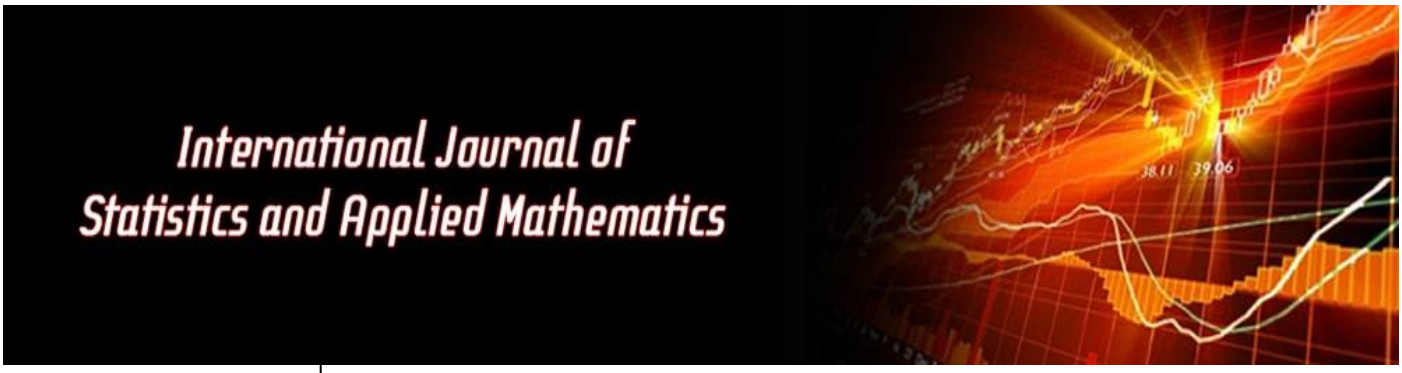

ISSN: 2456-1452
Maths 2023; SP-8(5): 249-252

https://www.mathsjournal.com
Received: 01-06-2023
Accepted: 05-07-2023

Umang B Patel
Ph.D Scholar, Department of Agricultural Economics, N. M. C. A., NAU., Navsari, Gujarat, India

Jay Delvadiya
Ph.D Scholar, Department of Agricultural Statistics, N. M. C. A., NAU., Navsari, Gujarat, India

Meera Padaliya
Ph.D Scholar, Department of Agricultural Economics, N. M. C. A., NAU., Navsari, Gujarat, India

Parul M Patel
Ph.D Scholar, Agricultural Economics, C. P. C. A., SDAU., Sardarkrushinagar, Gujarat, India

Corresponding Author:
Umang B Patel
Ph.D Scholar, Department of Agricultural Economics, N. M. C. A., NAU., Navsari, Gujarat, India

Seasonal indices and correlation between market arrivals and price of potato in Banaskantha District of Gujarat

Umang B Patel, Jay Delvadiya, Meera Padaliya and Parul M Patel

DOI: https://doi.org/10.22271/maths.2023.v8.i5Sd.1202

Abstract
Potato crop is the highest yielding vegetable in world as well as India. The prevalence of prices fluctuation of potato market is a common phenomenon due to seasonality and biological nature. This intricate interplay leads to substantial variations in potato output, consequently causing fluctuations in prices. So, the present study was conducted with seasonal variation and correlation between market arrivals and price of potato in Deesa market of Banaskantha district. The time series analysis of potato prices and arrivals was conducted in Deesa market for the period 2011-12 to 2020-21. The finding indicated that, the seasonal indices of arrivals reached their maximum during the harvest season and correspondingly decrease during the post-harvest seasons. Seasonal indices of prices decreased in harvest season and when the arrivals decreased, price increased in post-harvest season. Similarly, negative correlation found between the arrivals and prices of potato in certain year, indicating that prices of potatoes were independent on market arrivals in the regulated market.

Keywords: Potato, market arrivals, price, seasonal indices and correlation

Introduction
India is the world's second largest producer of vegetables, after only China. Vegetables are an essential part of the human diet. They are the primary source of vitamins and minerals for maintaining a healthy lifestyle (Singh, 2017) [5]. Potato is grown in practically every state in India under very variable agroclimatic conditions, with the majority of potatoes planted in the winter season under short day conditions and harvested from January to March. Approximately 85% of potato is grown in the Indo-genetic plains of north India. Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab, Assam, Haryana, Jharkhand, and Chhattisgarh are the major potato producing states

Prices fluctuation of agricultural commodities is a common phenomenon due to seasonality and biological nature of the crops and heavy dependence on climatic conditions resulting large variation in output. Wide variation in the production of the crops subsequently leads to larger variation in the market arrivals. It is argued that fluctuations in market arrivals are also responsible for short term price fluctuation arising out of imbalances in demand for and supply of agricultural commodities (Bera, 2017) [1]. Variation in output of potato over the years leads to wide fluctuation in its price exposing the growers to a high-risk situation.

Potato marketing is a major concern for farmers due to volatile nature of its price. Many studies have shown that every alternate year, potato prices fall due to glut situation in the market. Inadequate marketing infrastructure and a greater number of middlemen between producer & consumer result in high marketing cost which lowers the farmers' profitability. Lack of information on potential market as well as arrival & price behaviour of potato further worsen this situation for vegetable growers. Farmers must therefore have market intelligence on prospective market, quantity of arrival and price of potato in different months of the year (Singh, 2017) [5]. So, there is a need to have a proper understanding of the interrelationship between market arrivals and prices of farm products for formulating a sound agricultural price policy for price stabilization.

Under this back ground the present study is an attempt to deal with the seasonal indices of market arrivals and prices and their relationship between arrivals and prices of potato in Deesa market of Gujarat.

Methodology

The present study was carried out in Banaskantha district of Gujarat state, which was purposively selected. The Banaskantha district occupies the highest potato-producing district in Gujarat, which alone covered more than half of the total area and production of potato in the state. In Banaskantha district, Deesa Agricultural Produce Market Committee (APMC) was selected purposively for having higher arrivals of potatoes. The study completes done under the secondary data information on market arrivals and prices was obtained from the records of Deesa A.P.M.C. and the Government website.

Analysis of seasonality in arrivals and prices

The time series analysis of potato prices and arrivals was conducted for selected market for the period 2011-12 to 2020-21. Relative seasonal fluctuations were calculated after eliminating the trends, cyclic and irregular fluctuation with the twelve months moving average by assuming multiplicative relationship of arrivals and price. The relative seasonal indices were calculated from agricultural year 2011-12 to 2020-21 by using the following formula:

$$S = \frac{t \times c \times s \times i}{t \times c \times i}$$

Where,
t = trend
c = cyclical fluctuation
s = seasonal fluctuation
i = irregular fluctuation

Relationship between market arrival and price

The pattern of market arrivals and price behaviour of potato crops over the period 2011-2021 and also included monthly information was analysed the Karl Pearson correlation coefficient was find out the degree of behaviour between market arrivals and prices. The prices of the potato were predicted for different months using appropriate statistical models.

To examine the behaviour between monthly arrivals and prices, correlation coefficient 'r' was worked out for different years using the following formula:

$$r = \frac{\sum(XY) - \frac{(\sum X)(\sum Y)}{n}}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n}\right]\left[\sum Y^2 - \frac{(\sum Y)^2}{n}\right]}}$$

Where,
r = Correlation coefficient
X = Average monthly prices in rupees per quintal
Y = Total monthly arrivals in quintal
n = Number of observations

Test of significance of correlation coefficient

The calculated 'r' can be tested for its significance (i.e. whether greater than 0) by comparing it with the table value of 'r' available in standard books at n-2 degrees of freedom. In the absence of 'r' table values, the test of significance is accomplished by t-test as under.

Comparison of sample 'r' with population value

H_o: $\rho = 0$ (both the variables are not linearly associated)

H_a: $\rho \neq 0$

$t_{(n-2)} = r - \rho$ / SE of r SE of $r = \sqrt{\frac{1-r^2}{n-2}}$

$= \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}$

under Ho: $\rho = 0$

If cal. $t \geq$ table $t_{0.05, (n-2)}$ d.f. H_o: rejected

Rejection of H_o means there is an association between two variables under study.

If cal. $t <$ table $t_{0.05, (n-2)}$ d.f. H_o: accepted

Acceptance of H_o indicates that there is no association between two variables in the population.

Results and discussion

Seasonal indices of arrivals and prices

The seasonal variations are the changes which occur normally every year during the same period. The seasonal variations are caused mainly due to the seasonal nature of production of potato. The variation affects farmers income adversely because of the inverse relationship between arrivals and price. The study of seasonal indices of arrivals and price would show the extent of fluctuation in prices and arrivals from month to month.

The season indices of potato arrivals and prices of Deesa market are presented in table 1. It was found that the pattern of arrivals in Deesa market was maximum during January to march and decreased afterwards and were the lowest in the month of September. The arrivals however, picked up during December (106.06) and afterwards. The indices of arrivals showed that monthly indices in peak period i.e., January, February and March were the highest with 277.84, 285.82 and 157.12 quintals, respectively in Deesa market. During the mid period (June to September), the monthly arrivals showed indices between 47.93 to 41.30 quintals in Deesa market, and lean period the arrivals indices showed high, ranking 43.83 in October to 67.42 in December. This showed that the seasonal indices of arrivals reached their maximum during the harvest season and correspondingly decrease during the post-harvest seasons.

Table 1 further revealed that the seasonal variation indices in prices at Deesa market remained above average (100) in June to December and below average (100) in January to May. The index of seasonal prices variation was the lowest in month of February (61.55) and the highest November (131.71). The main reason for this seasonal variation in prices was due to the low volume of market arrivals, which were the highest during these months.

The seasonal indices of prices indices of price clearly indicated that the prices increased in the month of June (101.44) to December (106.06) in med and lean period, where the arrivals showed lower quantity. Thus, relatively as the arrivals increased, the price decreased in harvest season and when the arrivals decreased, price increased in post-harvest season. Table 1 indicate that the behavior of prices was not interrelated to against this pattern of arrivals.

Table 1: Seasonal indices of arrivals and price of potato in Deesa market of Banaskantha district (2011-12 to 2020-21).

Sr. no	Month	Deesa Market	
		Arrivals	Prices
1	January	277.84	80.52
2	February	285.82	61.55
3	March	157.12	65.89
4	April	75.01	81.38
5	May	64.00	89.35
6	June	47.93	101.44
7	July	50.51	112.48
8	August	45.40	124.47
9	September	41.30	119.74
10	October	43.83	125.40
11	November	43.83	131.71
12	December	67.42	106.06

Relationship between market arrivals and price

In this objective of the present study was attempted to analysed the correlation coefficient in market arrival and price of potato in Deesa market of Banaskantha district of Gujarat. The pattern of market arrivals and price behaviour of potato crop over the period 2011-12 to 2020-21 was analysed by using the Karl Pearson correlation coefficient method computed to find out the degree of behaviour between market arrivals and prices.

Correlation coefficient in market arrivals & prices of potato in Deesa market

The inter- relationship between yearly market arrivals and price of potato in Deesa market during the 2011-12 to 2020-21 was calculated using correlation coefficient (r) presented in Table 2, indicates that the correlation coefficient between potato arrivals and prices from the year 2012-13, 2014-15 and 2018-19 were negatively highly significant. The correlation coefficient was negatively significant in the year 2013-14, 2016-17 and 2020-21. Further, the year 2011-12 and 2015-16 were non-negatively significant. The negative correlation between arrivals and prices of potatoes was due to their definite relationship as potato arrivals increased, the price showed downward movement and vice-versa. Therefore, it can be revealed that prices of potatoes were independent on market arrivals in a regulated market. In the year 2017-18 and 2019-20 correlation coefficients between potato arrivals and prices were positively significant means increases in arrivals of potatoes in market with associated increases in prices of potato and vice-versa. Therefore, it can be revealed that prices of potatoes were independent on market arrivals in the regulated market.

Table 2: Correlation of prices and arrivals for potato in Dessa market from 2011-12 to 2020-21

Sr. No	Year	Correlation coefficient	Standard Error of correlation coefficient	"t" Calculated
1	2011-12	-0.4434	0.2834	1.564
2	2012-13	-0.7229**	0.2185	3.308
3	2013-14	-0.5767*	0.2583	2.232
4	2014-15	-0.8603**	0.1612	5.337
5	2015-16	-0.2644	0.3050	0.867
6	2016-17	-0.6937*	0.2278	3.046
7	2017-18	0.0059	0.3162	0.0187
8	2018-19	-0.8900**	0.1442	6.173
9	2019-20	0.2531	0.3059	0.8273
10	2020-21	-0.5260*	0.2689	1.956

** Significant at 1 per cent level of significance

* Significant at 5 per cent level of significance

Conclusion

In conclusion, India ranks second globally in vegetable production, with potatoes being a vital component of the diet. The cultivation of potatoes spans various states, primarily in North India. Fluctuations in output and market arrivals lead to price instability, impacting farmer profits. Inadequate marketing infrastructure, intermediaries, and a lack of market information contribute to the issue. This study focuses on the Deesa market in Gujarat. Aiming to understand the correlation between seasonal market arrivals and potato prices, which is crucial for effective agricultural price policies and stabilization efforts.

In this study, the analysis revealed distinct patterns influenced by the seasonal nature of potato production. The months from January to March experienced the highest arrivals, coinciding with the harvest season, while the post-harvest months saw decreased arrivals. Prices exhibited a corresponding seasonal pattern, with higher prices during the post-harvest months when arrivals were lower. This inverse relationship between arrivals and prices highlighted the market's vulnerability to fluctuating supply. The correlation coefficient analysis aimed to explore the relationship between annual market arrivals and potato prices over the years 2011–12 to 2020–21. Results demonstrated that the correlation between arrivals and prices varied across different years. Negative correlations were observed in certain years, indicating that increased arrivals were associated with decreased prices and vice versa. However, some years showed positive correlations, indicating that increases in arrivals corresponded with higher prices and vice versa.

Reference

1. Bera B. A study on the variability in market arrivals and prices of potato in some selected markets of West Bengal. International Journal of Agriculture Sciences. 2017;40(9):0975-3710.
2. Kundu P, Adhikary NK, Ghosal A. Vegetables marketing scenario and trends in prices and arrivals of vegetables in different markets of south 24 Parganas district of West Bengal, India. International journal of current microbology and applied sciences. 2019;8(12):1821-1840.
3. Rojasara AC, Singh N. Behavior of market arrivals and prices of cauliflower in selected markets of Gujarat. International Research Journal of Agricultural Economics and Statistics. 2020;11(1):81-86.
4. Saha N, Kar A, Jha GK, Venkatesh P, Kumar P. Market arrival and price behavior analysis of potato I four major markets in India. Economics affairs. 2020;4(65):529-533.

5. Singh DK, Pynbianglang K, Pandey NK. Market arrival and price behaviour of potato in Agra district of Uttar Pradesh. Economic Affairs. 2017;62(2):341-345.
6. Verma DK, Sharma L, Singh H, Suman J, Patil P. Seasonal pattern and comparative study of market arrivals of soybean crop in Southern Rajasthan, India. International Journal of Current Microbiology and Applied Sciences. 2018;7:481-490.
7. Wankhede P, Warade S. Performance of potatoes in Nagpur apmc market. International Journal of Agriculture Sciences. 2018;10(13):6536-6538.