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A Five-Year Analysis of Changes in Vegetable Arrivals at the APMC in Shajapur District: A Case Study of Potatoes, Onions and Garlic

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Abstract : The Agricultural Produce Marketing Committee (APMC) of Shajapur district plays a vital role in facilitating the marketing of agricultural produce, particularly vegetables. This study is based entirely on secondary data collected over a five-year period from 2018-2019 to 2022- 2023 focusing on the arrivals of key vegetables such as potatoes, onions, and garlic at APMC in Shajapur District. The objective is to analyze how the arrivals of these vegetables have changed over time and to explore the key factors influencing these changes. Factors such as climatic variations, shifts in cropping patterns, market demand, and price fluctuations have been considered to understand the observed trends. By systematically analyzing the annual arrival data, the study provides valuable insights into the dynamics of agricultural marketing in the region and suggests areas for improvement to strengthen the market system and agricultural planning.
Keywords- Agricultural Marketing, Climate Variations, Market Demand, Price Fluctuations, Vegetable Arrivals.

Introduction - Agriculture is the cornerstone of India's economy, providing employment to a significant portion of the population and contributing substantially to the national GDP. The agricultural sector not only supports domestic consumption but also plays a vital role in generating export revenue. Various districts across India are known for their unique agricultural contributions, and Shajapur, located in Madhya Pradesh, stands out as one such district. In Shajapur, agriculture remains the primary source of livelihood for a large portion of the population, with vegetables playing a critical role in the local economy. These crops are essential not only for local consumption but also significantly influence trade, local supply chains, and pricing mechanisms in the region. In Shajapur district, the Agricultural Produce Marketing Committee (APMC) serves as the central institution for the marketing and trade of agricultural produce, particularly vegetables. The APMC acts as a critical marketplace where farmers, traders, wholesalers, and retailers converge to buy and sell vegetables. This regulated market ensures a systematic approach to trade, promoting fair prices for both producers and consumers. Despite its crucial role, the quantity and types of vegetables arriving at APMC Shajapur have fluctuated significantly over the years. These variations are influenced by several factors, including climatic conditions, market demand, shifts in cropping patterns, and other economic variables impacting the agricultural sector. Climatic fluctuations, particularly unseasonal rains and extended dry periods, have a profound impact on vegetable yields in Shajapur. Such climatic changes can lead to reduced crop productivity, resulting in a decreased supply of vegetables in the market. The unpredictability of weather events has made it difficult for farmers to forecast their harvests, causing fluctuations in vegetable arrivals at APMC. These uncertainties disrupt the harvest schedules and affect both supply and demand dynamics. In addition to climate, shifts in cropping patterns among farmers also contribute to the variations in vegetable arrivals at APMC. Over time, farmers have altered their crop choices based on factors such as market demand, economic viability, and environmental conditions. This has led to changes in the types of vegetables available in the market, which directly affects pricing and supply. Market demand also experiences fluctuations due to factors such as seasonal preferences, changing consumer habits, and economic influences. Events like festive seasons and dietary trends play a crucial role in determining demand, while challenges like inadequate infrastructure, cold storage facilities, and transportation inefficiencies continue to impact the operations of APMC Shajapur.

Literature Review-

1. Samirkumar R. Bhadani and Snehal Mishra (2024) discussed, "Marketing of Fruits and Vegetables in the Agricultural Produce Marketing Committee, Vashi, Navi Mumbai". The purpose of this study is to examine the marketing dynamics and pinpoint areas for improvement

in the supply chain for fruits and vegetables at the Agricultural Produce Market Committee (APMC) in Vashi. The study looks into marketing expenses, sales and purchasing procedures, and the several aspects that affect price setting. Structured questionnaires were used to gather data. Their participation causes farmers' profit margins to shrink and marketing expenses to rise. The study also finds notable differences in pricing spreads, profit margins, and marketing expenses among various commodities. Price behavior is found to be significantly influenced by market rivalry, highlighting the significance of creating a more open and competitive economy.

2. Sharma Isha and Kumari Shailja (2021) examined "Trends in arrival and prices of major fruit and vegetables in APMC Kullu, Himachal Pradesh". The study discussed the trends in the arrival and prices of vegetable crops over a period of five years. It found that while prices of all vegetable crops increased, arrivals did not follow a consistent pattern. The variation in prices was lower compared to the variation in arrivals in the APMC Kullu and Lahul-Spiti markets. The seasonality of both fruit and vegetable crops was also investigated. Compared to vegetable crops, it was discovered that fruit crops had a comparatively low-price seasonality. Furthermore, because of local supply patterns, the seasonality in crop arrivals was much stronger for fruits, although the strong demand for both fruits and vegetables helped to limit the seasonality in prices.

3. Bhumit Shah, Shweta Chaudhry, Ajay Kumar Tripathi, Kiran Rana, Abhipsa Jena (2025) discussed "Impact of e-Nam on arrival and prices of selected vegetables: A case study of Rudrapur APMC". The study was conducted at the Rudrapur APMC in Udham Singh Nagar district, where data was gathered from two distinct groups: 40 farmers registered with e-NAM and 40 farmers who, although not registered, were actively involved in vegetable cultivation. The primary aim of this research was to assess the market dynamics and examine the effect of e-NAM registration on vegetable arrivals and pricing within the APMC.

4. Dr. Nilesh U. Bankar, Prof. Mohasin A. Tamboli (2018) examined "A Study of Fruits & Vegetables Marketing in Pune District: An Overview" highlighted the key challenges in marketing such as lack of infrastructure, poor storage facilities, and price fluctuations. They emphasized the need for improved logistics and modern market systems to ensure better price realization for farmers and reduce post-harvest losses.

Objectives of the Study:

1. To analyze the changes in the arrivals of major vegetables (potatoes, onions, and garlic) at the APMC in Shajapur District during the five-year period from 2018-2019 to 2022-2023.
2. To identify the key factors influencing the variations vegetable arrivals including climate conditions, market demand, pricing fluctuations and cropping patterns.
3. To provide recommendations for improving the agricultural market system and market planning.

Hypothesis-

H0: There is no significant change in the arrival of vegetables at the APMC in Shajapur District.

H1: There is a significant change in the arrival of vegetables at the APMC in Shajapur District.

Research Methodology- The research methodology employed in this study follows a systematic approach to investigate changes in the arrivals of vegetables at APMC in Shajapur district. This study is based on secondary data collected from the official records of the Agricultural Produce Marketing Committee (APMC), Shajapur. The data span a period from 2018-2019 to 2022-2023, and includes information from several mandis within the district, including Shujalpur, Shajapur, Kalapipal, Akodiya, Maksi, Bercha, and Mo. Badodiya. Quantitative methods are used to analyze trends, fluctuations, and other influencing factors, ensuring the reliability and relevance of the findings.

Data Analysis and Interpretation-

I. Analysis of changes in Vegetable Arrivals at APMC in Shajapur District.

Data were collected from the records maintained by the APMC office in Shajapur over a five-year period, covering the arrivals of potatoes, onions, and garlic from 2018-2019 to 2022-2023. The data set includes total annual arrivals for each of these vegetables and has been analyzed to identify trends and changes over the years.

Figure I: The data has been summarized and represented in the table below to show the vegetable arrivals at APMC over the five-year period. Additionally**, percentage changes** will be calculated to analyze the variations in the arrivals of potatoes, onions, and garlic. This analysis will help in understanding the trends and factors affecting the changes in arrivals. The changes in arrivals will also be visually represented using a **bar graph** to provide a clear comparison across the years.

Table (see in last page)

To analyze the variations in the total vegetable arrivals over the five-year period (2018-2019 to 2022-2023), the percentage change will be calculated year-by-year.

Formula-

Percentage Change:

$$\frac{\text{(Current Year Arrival - Previous Year Arrival)}}{\text{(PreviousYear Arrival)}} \times 100$$

Below is the year-wise table showing the total arrivals of vegetables and the percentage change for each year (2018-2019 to 2022-2023).

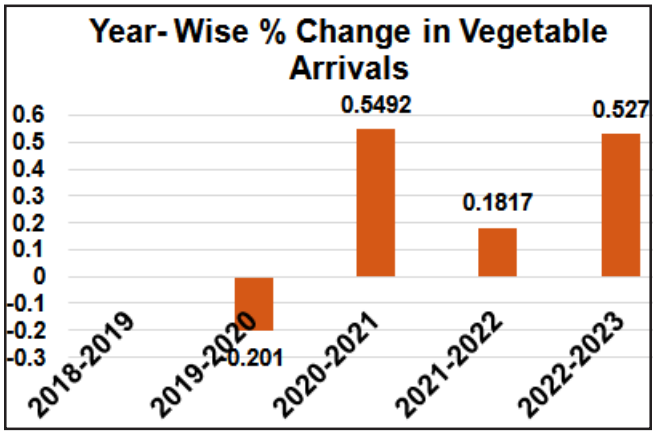
S.	Year	Total Arrivals	Percentage Change%
1	2018-2019	2680008	-
2	2019-2020	2141334	-20.10% (Decrease)
3	2020-2021	3317340	+54.92% (Increase)
4	2021-2022	3920159	+18.17%(Increase)
5	2022-2023	5986234	+52.70% (Increase)

Interpretations:

1. The percentage change cannot be calculated for 2018-2019 as it is the base year.
2. 2019-2020: The total arrivals of vegetables decreased by 20.10% compared to the previous year (2018-2019). This significant drop could be attributed to various factors such as market fluctuations, adverse climatic conditions, or reduced agricultural output during that year.
3. 2020-2021: The total arrivals saw a dramatic increase of 54.92%. This rise suggests a recovery or growth in vegetable production, likely due to better climatic conditions, higher crop yields, or increased demand in the market during this period.
4. 2021-2022: A moderate increase of 18.17% in vegetable arrivals compared to 2020-2021 indicates consistent growth in production or improved supply chain efficiency, though at a slower pace than the previous year.
5. 2022-2023: The total arrivals increased by 52.70%, which is another significant rise. This sharp increase could be attributed to favorable weather conditions, increased production capacity, or higher market demand during this year.

Over the five-year period from 2018–2019 to 2022–2023, the total vegetable arrivals at APMC Shajapur showed significant fluctuations. After a notable decline in 2019-2020, there was a strong upward movement in the subsequent years, with particularly sharp increases in 2020-2021 and 2022-2023. These changes reflect the impact of varying agricultural practices, climatic conditions, and market forces, indicating an overall positive growth trend in vegetable arrivals.

The following graph visually represents the year-wise total arrivals of key vegetables potatoes, onions, and garlic) at APMC, Shajapur District, highlighting the trends and fluctuations observed over a five-year period.



Result: The graphical representation clearly illustrates the **year-wise fluctuations** in the total arrivals of vegetables, reflecting both significant increases and decreases over the five-year period. **Notably, a substantial decrease of 20.10% was observed in 2019-2020**, followed by a **sharp increase of 54.92% in 2020-2021**, and subsequent **steady increases** in the following years. These trends **align with** the statistical analysis, which led to the rejection of the **null hypothesis (H_0)**, which proposed no significant change in arrivals. The acceptance of the **alternative hypothesis (H_1)** confirms that there is **indeed** a significant change in the arrivals of vegetables at APMC in Shajapur district from 2018–2019 to 2022–2023.

Findings:

1. There was significant year-wise variation in total vegetable arrivals from 2018-2019 to 2022- 2023, indicating fluctuations in production and supply influenced by climatic and market conditions.
2. In 2019-2020, a sharp decline of 20.10% in arrivals was recorded, likely due to adverse weather and disruptions in the agricultural supply chain.
3. In 2020-2021, arrivals surged by 54.92%, suggesting a strong recovery in production, potentially driven by improved climate, higher yields, and strong demand.
4. In 2021-2022, arrivals grew by 18.17%, pointing to stable and consistent production, though the growth rate was lower than the previous year.
5. The year 2022-2023 saw another sharp increase of 52.70%, reinforcing the continued growth in agricultural output and market responsiveness.
6. Climatic conditions and market demand impacted vegetable arrivals and cropping patterns, with unfavorable weather reducing output and favorable conditions boosting supply. Market trends also led farmers to focus more on high-demand vegetables like onions and garlic.

Suggestions- To ensure stability in vegetable arrivals and better support farmers, several measures are recommended. First, strengthening weather monitoring systems and providing timely advisories can help farmers manage weather-related risks. Second, promoting crop diversification through training and financial incentives can reduce reliance on specific vegetables like onions and garlic. Improving market linkages, such as transportation, cold storage, and market connectivity, will reduce post-harvest losses. Price stabilization measures are also essential to protect farmers from volatile prices. Finally, a data-driven approach to planning, based on arrival trends, will enable informed decisions on procurement, storage, and distribution, benefiting both farmers and markets.

Conclusion- The five-year analysis 2018-2023 of vegetable arrivals at APMC Shajapur shows notable year-to-year fluctuations, including a decline in 2019-2020 followed by consistent increases particularly sharp in 2022-2023. These changes were shaped by climatic conditions, market demand, and cropping patterns. Statistical analysis confirms significant variation, rejecting the null hypothesis. Overall, the trend reflects positive growth, highlighting the need for

better agricultural planning, infrastructure, and farmer support for a stable and efficient supply chain.

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Table: Annual Arrivals of Vegetables (Potatoes, Onion, and Garlic) at Different Locations in Shajapur District (2018-2019 to 2022-2023), based on secondary data obtained from the APMC Office, Shajapur (All Arrivals are in Quintals).

Year 2018-2019

S.	Vegetable Name	Shujalpur	Shajapur	Kalapipal	Akodiya	Maksi	Bercha	Mo. Badodiya	Total
1	Potato	3554	17943	0	0	0	0	0	21497
2	Onion	710397	905147	6654	438769	0	0	0	2060967
3	Garlic	411839	142581	4763	38361	0	0	0	597544
	Total	1125790	1065671	11417	477130	0	0	0	2680008

Year 2019-2020

S.	Vegetable Name	Shujalpur	Shajapur	Kalapipal	Akodiya	Maksi	Bercha	Mo. Badodiya	Total
1	Potato	11121	120191	0	1399	0	0	0	132711
2	Onion	526336	643917	123427	486778	0	0	0	1780458
3	Garlic	176532	11508	18398	21727	0	0	0	228165
	Total	713989	775616	141825	509904	0	0	0	2141334

Year 2020-2021

S.	Vegetable Name	Shujalpur	Shajapur	Kalapipal	Akodiya	Maksi	Bercha	Mo. Badodiya	Total
1	Potato	9052	71215	353	942	0	0	0	81562
2	Onion	785520	1268091	180074	665494	0	260	0	2899439
3	Garlic	178469	86559	34065	37246	0	0	0	336339
	Total	973041	1425865	214492	703682	0	260	0	3317340

Year 2021-2022

S.	Vegetable Name	Shujalpur	Shajapur	Kalapipal	Akodiya	Maksi	Bercha	Mo. Badodiya	Total
1	Potato	11482	239908	399	2042	0	681	0	254512
2	Onion	577583	1895369	107290	527210	0	13776	0	3121228
3	Garlic	248578	153522	54327	87344	0	648	0	544419
	Total	837643	2288799	162016	616596	0	15105	0	3920159

Year 2022-2023

S.	Vegetable Name	Shujalpur	Shajapur	Kalapipal	Akodiya	Maksi	Bercha	Mo. Badodiya	Total
1	Potato	2983	201894	243	992	0	0	0	206112
2	Onion	698029	2993169	144123	714762	0	5616	0	4555699
3	Garlic	526817	308240	157532	231683	0	151	0	1224423
	Total	1227829	3503303	301898	947437	0	5767	0	5986234

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