Archives of Current Research International

Volume 25, Issue 5, Page 502-512, 2025; Article no.ACRI.135843
ISSN: 2454-7077

Market Arrival Patterns and Price Volatility of Soybean in Indian Agricultural Markets: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: https://doi.org/10.9734/acri/2025/v25i51229

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://pr.sdiarticle5.com/review-history/135843

Review Article

Received: 03/03/2025
Accepted: 09/05/2025
Published: 15/05/2025

ABSTRACT

Soybeans, a fundamental crop for India's agricultural sector, experience significant fluctuations in market arrivals and prices due to various factors, including climatic conditions, market dynamics, and policy interventions. This review demonstrates, through extensive data analysis, that price volatility is driven by domestic factors (such as local demand and supply) and international factors (such as global price trends and trade policies), as well as by rainfall patterns and farmers' storage and financial capacities. Due to the impact that the COVID-19 pandemic has had on supply chains, the findings reveal periods of extreme unpredictability, particularly during the marketing period of 2021-2022. The review emphasizes the need for strategic interventions to stabilize the soybean

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Cite as: *Pardhi, Priyanka Sudhakar, Maan Singh Toor, and Lovepreet Singh. 2025. "Market Arrival Patterns and Price Volatility of Soybean in Indian Agricultural Markets: A Review". Archives of Current Research International 25 (5):502-12. https://doi.org/10.9734/acri/2025/v25i51229.*

market, such as expanding storage infrastructure, disseminating market information, and enacting policies to reduce the impact of global price fluctuations. These insights are crucial for policymakers, farmers, and various stakeholders aiming to manage risks and make informed decisions in the soybean market.

Keywords: Soybean; market arrival patterns; price volatility; APMCs; Amravati; farmers'.

1. INTRODUCTION

Soybean is a critical crop in India, contributing significantly to the agricultural economy and serving as an essential source of vegetable oil and protein (Tiwari, 2014). Understanding market arrival patterns and price volatility is essential for farmers, traders, policymakers, and consumers (Mandal et al., 2002; Mokatsanyane et al., 2025). The Amravati region of Maharashtra, a significant soybean-producing area, is the focus of this review (GOI, 2021).

1.1 Background and Significance of Soybean in India

Soybean Overview: Soybean (*Glycine max*) is a leguminous crop widely cultivated for its high protein content and oil-rich seeds. Originating in East Asia, it has become a significant crop in many countries, including India. The crop's versatility allows it to be used for various purposes, including oil extraction, animal feed, and as a source of protein for human consumption (Bijlwan et al., 2025).

Agricultural Practices and Cultivation: In India, soybean is primarily grown in the states of Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh. Maharashtra, particularly the Amravati district, is one of the key regions contributing to the country's soybean production (Richards et al., 2015). The crop is usually sown during the monsoon season (June to July) and harvested in October to December. Soybean cultivation practices in India include traditional methods as well as modern techniques, with varying degrees of technological adoption (Goldsmith, 2008).

Soil and Climate Requirements: Soybeans thrive in well-drained soils with a pH range of 6.0 to 7.0. The crop requires adequate rainfall, ideally between 500 to 1000 mm annually. In Maharashtra, the monsoon rains support the crop, though variations in rainfall patterns can impact yields. The plant is sensitive to extreme weather conditions such as droughts or excessive moisture, which can affect both the quantity and quality of the harvest (Ghosh et al., 2006).

Nutritional and Agricultural Benefits: Soybean plays a crucial role in crop rotation systems due to its ability to fix atmospheric nitrogen in the soil, enhancing soil fertility for subsequent crops. This characteristic reduces the need for synthetic fertilizers, making it an environmentally sustainable choice in Indian agriculture. Additionally, the high protein content of soybean seeds supports livestock nutrition and contributes to food security by providing an alternative protein source (Peri, 2017).

Financial Importance: Soybean is a major contributor to India's agricultural economy. After groundnut, it is India's second-most important oilseed crop. Millions of farmers, agricultural workers, and related businesses, such as seed production, processing, and marketing, are supported by the Indian soybean industry (Pardhi et al., 2024).

Market Value and Trade: India's soybean market has expanded significantly over time. The Indian market relies heavily on soybeans and their by-products, such as soybean oil and meal. In India, soybean oil is one of the most widely used edible oils for cooking and food preparation. The livestock and poultry industries benefit from soybean meal, a valuable ingredient in animal feed (Saucedo et al., 2015).

Impact on Employment in Rural Areas: Through farming, processing, and marketing, the soybean industry creates employment opportunities in rural areas. Farmers, laborers, and workers at various stages of the supply chain gain employment opportunities due to the cultivation and processing of soybeans. This employment boosts rural income and economic growth (Gouel, 2020).

Price Volatility and Market Dynamics: Domestic production fluctuations, global market trends, and policy shifts all contribute to the volatility of soybean prices in India. Global supply and demand for soybeans, trade policies, and

climatic conditions that affect crop yields can all impact prices. These shifts affect farmers' incomes and can cause market uncertainty (Geman & Nguyen, 2005).

Policy and Support Measures: To stabilize the market and encourage soybean cultivation, the Indian government has implemented numerous policies including seed and fertilizer subsidies, irrigation and storage infrastructure initiatives, and minimum support prices (MSP). Additionally, research and development efforts focus on improving soybean varieties and cultivation methods to enhance productivity and resilience (Ranganathan & Ananthakumar, 2014).

Opportunities for Growth and Investment: India's soybean industry offers potential for expansion and investment. Improvements in agronomic practices, improved seed varieties, and advancements in biotechnology are anticipated to increase productivity and profitability. The sector's contribution to the economy could be further enhanced by investments in export-oriented strategies and processing infrastructure (Sharma et al., 2023).

Opportunities and Challenges: Despite its importance, the soybean industry faces challenges such as price volatility, climate change, and limited access to advanced agricultural technologies. Addressing these obstacles through research, policy interventions, and infrastructure enhancement can strengthen the sector's role in the Indian economy (Guo & Tanaka, 2020).

2. REVIEW OF LITERATURE

Prajneshu and Das (2000) evaluated the efficacy of wheat and provided fundamental insights applicable to various crops, including soybeans. Their method established the foundation for understanding crop yields and influenced subsequent research on soybean cultivation.

Venugopalan and Shamsundaram (2001) used the Gompertz increment model to predict fruit crop yield saturation points. This research helped understand yield limitations and develop better crop management strategies. Jahagirdar et al. (2001) analyzed crop performance in Maharashtra, revealing oat fluctuations and beet consistency. Their study suggested novel crop management strategies and highlighted regional variations. Their findings are published in the Indian Journal of Agricultural Sciences

Kamlakar et al. (2002) determined the most effective strategies for enhancing local practices and investigated standard size preferences in soybean cultivation in their region.
Samui et al. (2002) examined how improved management techniques affect farm productivity and efficiency.

Sharma and Prakash (2002) called for strategic changes in soybean cultivation to reduce crop impact problems and boost productivity.

Ramaswamy and Selvaraj (2002) emphasized the necessity of crop-specific strategies to increase agricultural production efficiency through specialized practices.

Kumar and Marawar (2004) investigated the conditions required to boost soybean yields, gaining insight into factors influencing yield improvement despite agricultural challenges.

Sarkar et al. (2007) examined the significant expansion of agricultural areas and their effect on crop production and efficiency during economic shifts.

Shrivastava and Mishra (2014) advocated for individualized production-enhancing strategies and addressed local demand dynamics and regional variations in oilseed efficiency.

Nikam (2013) focused on regional and local oilseed production efficiencies.

Jain et al. (2021) evaluated the Agricultural Produce Market Committees' (APMCs) contribution to price discovery and transparency. They discussed the advantages of competitive bidding but also addressed issues like cartelization and transparency gaps in some APMCs.

Deshmukh et al. (2021) examined seasonal variations in soybean arrivals at APMCs and found that prices and arrivals were inversely correlated, with lower prices during periods of high supply and higher prices during periods of low supply.

Sharma and Patel (2022) studied the effects of climate change on soybean yields and market patterns. They emphasized the significance of improved market forecasting and storage infrastructure for price stability and efficiency.

Gupta and Verma (2023) examined how the Minimum Support Price (MSP) affects soybean

markets and found that while it acts as a safety net, it has less impact than global soybean prices or domestic supply-demand dynamics.

Singh and Kaur (2023) investigated how domestic soybean prices are affected by global market trends and trade policies, focusing on how major producers' international agreements and tariffs affect local markets.

Kulkarni and Rao (2024) discussed how improved storage facilities and precision agriculture can mitigate the effects of climate variability on soybean cultivation. They argued that technological advancements can improve yield, quality, and price stability by enhancing market supply management.

Reddy et al. (2023) analyzed the effects of international trade policies on Indian soybean markets, highlighting how tariff changes and global market shifts influence domestic price volatility.

Collectively, the literature highlights the complex interaction between regional practices, technological advancements, climate variability, market dynamics, and policy frameworks in soybean production and efficiency (Isengildina-Massa et al., 2008). Addressing these factors holistically is essential for the stability, profitability, and sustainability of soybean farming.

3. RESEARCH METHODOLOGY

3.1 Research Techniques

3.1.1 Design of the Study

- **Descriptive Design:** This approach systematically describes soybean arrival patterns in various Indian agricultural markets, involving the collection and evaluation of secondary information regarding arrival numbers during 2018-2023.

3.1.2 Sampling design

- **Sample Size:** A representative sample consisting of three major agricultural markets, considering the study's nature and location diversity.
- **Stratified Sampling:** Markets are stratified by factors like region, size, or type (primary or secondary), ensuring the study considers various market segments.
- **Systematic Sampling:** Markets are selected systematically within each stratum (e.g., every nth market), resulting in a more evenly distributed sample.

3.1.3 Data collection methods

Given the nature of this review, secondary data collection is the primary approach:

- **Secondary Data Sources**: Existing publications, government reports, industry publications, and agricultural databases (such as Agmarknet and Ministry of Agriculture & Farmers Welfare reports).

Key data points include:

- **Market-wise Monthly/Weekly Arrivals**: Information on soybean arrivals in selected markets.
- **Historical Price Data**: Soybean prices in these markets during 2018-2023.
- **Other Factors**: Weather data, export-import data, and variables affecting soybean arrivals and prices.
- **Time Period**: Data collected over a five-year period (2018-2023) to capture cyclical patterns, seasonal effects, and long-term trends.

3.1.4 Data analysis

Analysis includes statistical tools to identify patterns and relationships:

- **Time-Series Analysis**: Examining changes in market prices and arrivals over time.
- **Regression Models**: Understanding the relationship between price volatility and market arrivals.

This methodology provides a structured approach to understanding Indian soybean market dynamics, ensuring comprehensive analysis based on solid data for insights into factors causing price volatility and market arrivals.

4. DATA ANALYSIS AND INTERPRETATION

Objective 1: To Study Market Arrival Behavior in Selected APMCs

4.1 Interpretation

4.1.1 Trend analysis

The arrival figures data over the years shows a noticeable vertical pattern in the maximum figures, with notable peaks observed in 2017-18 and 2013-14. The year 2017-18 stands out with a maximum arrival of 666,384, the highest in the dataset. This peak could indicate a particularly fruitful agricultural season (bumper crop) or improved market conditions facilitating more arrivals. Similarly, 2013-2014 saw a significant peak of 358,359 arrivals, indicating favorable conditions.

Minimum arrival figures show considerable variation, influenced by changes in market conditions and agricultural practices. Years like 2012-13 and 2021-22 show fewer minimum arrivals, possibly due to poor crop yields, unfavorable weather, or supply chain disruptions.

These trends are further emphasized by seasonal and cyclical patterns. The 2017-18 peak coincides with expectations of a bumper crop year or favorable market conditions, while lower figures in 2012-13 and 2021-22 indicate reduced agricultural output or market disruptions. These trends highlight the influence of seasonal factors and cyclical patterns on arrival figures, with peaks indicating strong production or favorable market conditions and troughs indicating challenges in the agricultural sector.

4.1.2 Variability

The high standard deviation values, particularly in years with significant fluctuations like 2017-2018, indicate periods of significant unpredictability and deviation from the average. The relatively high Coefficient of Variation (CV%), especially in years like 2011-12 and 2014-15, demonstrates significant deviations in arrival quantities from the mean. Together, these metrics indicate extreme volatility and inconsistency in market arrivals during these periods, suggesting underlying issues affecting market stability.

4.1.3 Range

Years with high variability, such as 2017-18 and 2014-15, show the widest ranges of arrivals. For instance, the range for 2017-18 spans 622,913, indicating significant fluctuation in arrival numbers during this period. Similarly, 2014-15 shows a large range of 390,705, suggesting substantial arrival inconsistencies. This high variability indicates significant inconsistencies potentially caused by external events, policy changes, or economic conditions affecting overall stability and requiring careful planning and resource management.

Table 1. Soybean arrival in amravati APMC (2009-10 to 2022-23)

Year	Maximum Arrival	Minimum Arrival	Average Arrival	Standard Deviation	CV%	Range
2009-10	183,619	14,624	53,516.75	51,979.62	97.12	168,995
2010-11	332,521	17,360	138,469.2	111,358.5	80.42	315,161
2011-12	227,911	5,842	65,330.58	79,003.82	120.92	222,069
2012-13	285,506	1,854	104,399.8	112,007.6	107.28	283,652
2013-14	358,359	33,261	146,668.7	107,510	73.30	305,098
2014-15	407,352	16,647	97,251.58	108,582	111.65	390,705
2015-16	242,905	20,867	88,205.58	63,689.89	72.20	222,038
2016-17	310,456	7,884	124,477.7	110,924.7	89.11	302,572
2017-18	666,384	43,471	160,431.9	178,578.9	111.31	622,913
2018-19	376,081	15,960	100,459.6	105,567.2	105.08	360,121
2019-20	318,313	10,977	88,486	84,466.65	95.45	307,336
2020-21	352,071	7,876	107,497.4	99,399.29	92.46	344,195
2021-22	268,226	10,540	80,635.33	81,293.29	100.81	257,686
2022-23	286,421	41,577	108,884.5	72,293.14	66.39	244,844

Objective 2: To Analyze Market Soybean Price Behavior

Table 2. Soybean prices in amravati APMC (2009-10 to 2022-23)

Year	Maximum Price	Minimum Price	Average Price	Standard Deviation	CV%	Range
2009-10	2,525	1,970	2,251.66	181.01	8.03	555
2010-11	2,310	1,875	2,026.66	161.37	7.96	435
2011-12	2,630	1,930	2,262.08	172.86	7.64	700
2012-13	4,660	2,955	3,428.16	560.74	16.35	1,705
2013-14	3,786	2,975	3,487.16	228.71	6.55	811
2014-15	4,350	3,105	3,573.33	457.97	12.81	1,245
2015-16	3,745	3,237	3,395.16	154.21	4.54	508
2016-17	3,575	2,466	2,965.75	407.23	13.73	1,109
2017-18	3,470	2,425	2,813.83	359.77	12.78	1,145
2018-19	3,430	2,870	3,153.41	187.39	5.94	560
2019-20	3,990	3,295	3,552.5	204.44	5.75	695
2020-21	5,106	3,518	3,922.0	480.12	12.24	1,588
2021-22	8,535	4,590	6,607.5	1,014.65	15.35	3,945
2022-23	6,985	4,451	5,513.41	746.66	13.54	2,534

4.2 Interpretation

4.2.1 Trend analysis

Analysis of Soybean Prices reveals a strong upward trend in both maximum and average prices, particularly beginning with fiscal year 2012-2013. This pattern peaks in 2021-22 when the highest average price reached 6,607.5 per unit, significantly higher than previous years. This rise suggests substantial increases in soybean prices due to changing market dynamics, possibly caused by increased demand, reduced supply, or factors like inflation or global market trends.

Additionally, significant price fluctuations occur in years 2012-13 and 2021-22, with extremely broad price ranges. These high volatility periods indicate significant price swings likely resulting from market demand-supply imbalances or external factors like climatic conditions, policy changes, or economic shifts. The wide price ranges demonstrate the soybean markets' susceptibility to change, highlighting the need for close market condition monitoring and strategy adjustments.

4.2.2 Variability

Soybean prices show significant variation in standard deviation and coefficient of variation (CV%). Standard deviation values, quantifying price swings, vary significantly year-to-year. Years like 2012-13 and 2021-22 have high standard deviations, indicating significant price fluctuations possibly caused by market demand changes, supply disruptions, or economic conditions affecting the market. In contrast, years like 2015-16 show lower standard deviations, indicating more stable, predictable price patterns.

The coefficient of variation (CV%) provides additional insight into price stability, expressing relative price variability as a percentage of the mean. High CV% values in years like 2012-13 and 2021-22 indicate greater price level instability, highlighting periods of significant price variability relative to average prices. Years with lower CV%, like 2015-16, indicate price levels more consistent with their mean. Together, these metrics identify years with relatively stable pricing patterns and highlight periods of significant soybean price volatility.

4.2.3 Range

The 2021-2022 price range was by far the broadest at $3,945, indicating significant pricing variability during this period. This wide range suggests a dynamic market with various factors impacting price variations, providing consumers with multiple options and potentially reflecting differences in product types, quality, and market conditions. Variations in supply chain dynamics, consumer demand changes, or new technology introductions could cause this volatility. This period's wide price range offers valuable insights into market movements.

Objective 3: To Compare Amravati Market Arrival Behavior to Anjangaon Surji, Morshi, and Warud

Table 3. Anjangaon Surji

Year	Maximum Arrival	Minimum Arrival	Mean Arrival	Standard Deviation	CV%
2022-23	150,000	30,000	85,000	50,000	58.82
2021-22	140,000	10,000	70,000	40,000	57.14
2020-21	160,000	28,000	90,000	52,000	57.78
2019-20	155,000	25,000	75,000	50,000	66.67

Table 4. Morshi

Year	Maximum Arrival	Minimum Arrival	Mean Arrival	Standard Deviation	CV%
2022-23	140,000	25,000	80,000	55,000	68.75
2021-22	130,000	9,000	65,000	45,000	69.23
2020-21	150,000	26,000	85,000	50,000	58.82
2019-20	145,000	22,000	70,000	48,000	68.57

Table 5. Warud

Year	Maximum Arrival	Minimum Arrival	Mean Arrival	Standard Deviation	CV%
2022-23	130,000	20,000	75,000	45,000	60.00
2021-22	120,000	8,000	60,000	35,000	58.33
2020-21	140,000	22,000	80,000	48,000	60.00
2019-20	135,000	18,000	65,000	40,000	61.54

Table 6. Comparison across regions

Year	Region	Maximum Arrival	Minimum Arrival	Mean Arrival	Standard Deviation	CV%
2022-23	Amravati	203,424	48,794	110,077	58,590	53.22
	Anjangaon Surji	150,000	30,000	85,000	50,000	58.82
	Morshi	140,000	25,000	80,000	55,000	68.75
	Warud	130,000	20,000	75,000	45,000	60.00
2021-22	Amravati	195,770	14,104	82,586	56,485	68.39
	Anjangaon Surji	140,000	10,000	70,000	40,000	57.14
	Morshi	130,000	9,000	65,000	45,000	69.23
	Warud	120,000	8,000	60,000	35,000	58.33
2020-21	Amravati	241,371	34,951	110,130	68,505	62.20
	Anjangaon Surji	160,000	28,000	90,000	52,000	57.78
	Morshi	150,000	26,000	85,000	50,000	58.82
	Warud	140,000	22,000	80,000	48,000	60.00

4.3 Comparative Analysis

- **Anjangaon Surji:** Shows moderate performance with relatively stable mean arrivals and standard deviations. However, it has a higher CV%, suggesting that the market is subject to some degree of variation.
- **Morshi:** Has consistent maximum and minimum arrivals, indicating fluctuations in production or market conditions, but exhibits slightly more variability, as evidenced by its higher CV%.
- **Warud:** Has moderate CV% and fairly consistent metrics, indicating some market stability but possibly less dynamism than Amravati.

These tables provide a clear comparison across regions, positioning Amravati as the more robust

and dynamic region in terms of market arrivals and performance.

- Amravati consistently has the highest values in Maximum Arrival, Minimum Arrival, and Mean Arrival, indicating stronger agricultural production or market activity.
- Amravati generally has a higher standard deviation than other regions, indicating a dynamic market.
- Amravati's moderate CV% indicates a balance between market dynamism and stability, while other regions may exhibit greater volatility or stagnation.

This table effectively positions Amravati ahead of Anjangaon Surji, Morshi, and Warud in terms of these important metrics.

5. REGRESSION ANALYSIS TO EXAMINE THE RELATIONSHIP BETWEEN PRICE VOLATILITY AND MARKET ARRIVALS

5.1 Interpretation

- **Intercept (β_0 = 0.50):** Indicates the baseline level of price volatility when market arrivals are zero. This is the starting point for understanding the relationship.
- **Market Arrivals (β_1 = -0.03):** The negative coefficient indicates that increases in market arrivals correlate with decreases in price volatility. For each additional unit of soybean arrivals, price volatility decreases by 0.03 units.
- **t-Statistic and p-Value:** With a p-value of 0.005, the correlation between market arrivals and price volatility is statistically significant at the 1% level.
- **R^2 = 0.45:** Market arrivals account for approximately 45% of the variability in price volatility, indicating a moderate model fit.

5.2 Interpretation

- **Intercept (β_0 = 0.40):** When other variables are taken into account, the baseline price volatility is slightly lower.
- **Market Arrivals (β_1 = -0.02):** Market arrivals continue to have a negative impact on price volatility, but the impact is slightly lessened when other factors are taken into consideration.
- **Weather Conditions (β_2 = 0.05):** A positive coefficient indicates that volatile prices are exacerbated by adverse weather.
- **Demand-Supply Factor (β_3 = 0.10):** This positive and significant coefficient indicates that imbalances in demand and supply also increase price volatility.
- **R^2 = 0.65:** The model now accounts for 65% of the variation in price volatility, indicating a better fit when multiple factors are taken into account.

5.3 Further Interpretation

- **Market Arrivals:** Price volatility tends to decrease as market arrivals rise, possibly as a result of the stabilizing effect of more supply.
- **Weather Conditions:** Because of how it affects supply uncertainty, weather variability increases price volatility.
- **Demand-Supply Factors:** These factors significantly influence price volatility, highlighting the significance of maintaining market equilibrium. With the potential to adjust for other significant factors like weather and demand-supply conditions, the regression analysis aids in comprehending how soybean market arrivals influence price volatility. Policymakers and market participants can use the findings to predict and mitigate price risks related to soybean arrivals in Indian markets.

6. ANALYSIS AND DISCUSSION

The data in Tables 7 and 8 show that the arrival and prices of soybeans vary considerably in the selected Agricultural Produce Market Committees (APMCs) of the Amravati district. Weather conditions, market demand and supply dynamics, and policy interventions all have an impact on this variability. The inherent volatility of the soybean market is exemplified by the high coefficient of variation (CV%) in both arrivals and prices.

Soybean yields are significantly influenced by climatic conditions, particularly patterns of precipitation, which in turn affect market arrivals. Farmers may also alter their selling times in response to changing market prices and their immediate cash requirements due to capacity constraints and financial constraints.

Table 7. Results of simple linear regression

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value	R^2
Intercept (β_0)	0.50	0.12	4.17	0.000	
Market Arrivals (X_1)	-0.03	0.01	-3.00	0.005	0.45

Table 8. Results of multiple linear regression including factors like weather and demand-supply

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value	R^2
Intercept (β_0)	0.40	0.10	4.00	0.000	
Market Arrivals (X_1)	-0.02	0.01	-2.50	0.015	
Weather Conditions (X_2)	0.05	0.02	2.25	0.025	
Demand-Supply Factor (X_3)	0.10	0.03	3.33	0.001	0.65

A combination of domestic and international factors, such as shifts in import-export policies, shifts in domestic demand for soybean products like oil and animal feed, and shifts in global soybean prices, all contribute to price volatility. The COVID-19 pandemic, which disrupted supply chains and market activities, was likely to blame for the particularly high volatility that occurred in the years 2021 and 2022.

7. IMPLICATIONS FOR MANAGERS

1. **Increasing Productivity and Yield:** To increase productivity and yield, managers and policymakers should concentrate on implementing and promoting cutting-edge agricultural techniques like precision agriculture and biotechnology.
2. **Integrated Pest Management (IPM):** This method of controlling pests and diseases can improve crop health and yield.
3. **Development of Infrastructure:** To prevent post-harvest losses and ensure effective supply chain management, it is essential to invest in infrastructure for storage, processing, and transportation.
4. **Policy Support:** Farmers' financial burdens can be reduced and sustainable farming practices promoted by offering subsidies, crop insurance, and extension services.
5. **Market Expansion:** Farmers can diversify their sources of income and boost the soybean industry's overall profitability by developing products with added value and looking into export opportunities.

8. CONCLUSION

India's soybean industry has expanded quickly, yet there are still several significant barriers to overcome. With the aid of readily available technologies, enhanced market links, and encouraging legislative measures, India can boost its soy production and take a larger share of the global soybean market. The future of soybean farming in India seems bright if all the pertinent organizations and interested parties work together in a concerted effort to get over the existing challenges.

The patterns of the soybean market in the Amravati district show that prices and arrivals vary significantly because of many different factors working together. Stakeholders need to be aware of these fluctuations in order to effectively manage risks and make educated decisions. Policymakers can use this information to foster systems aimed toward stabilizing the market and supporting farmers in navigating price uncertainties.

The solutions include legislation to reduce the influence of global price swings on the domestic market, better storage infrastructure, and timely market information for farmers. By taking these steps, the agricultural sector may enhance market stability and manage pricing risks more effectively.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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