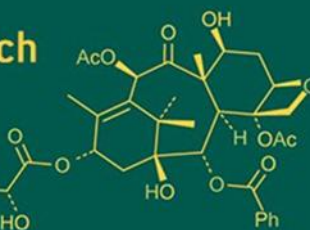
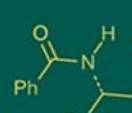
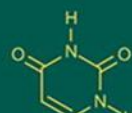
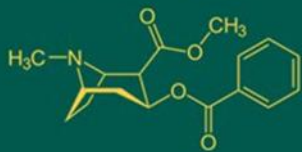


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A Study on factors responsible for lead time optimization and sales return management of an agribusiness firm in Hyderabad

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Abstract

In today's fast-paced agribusiness market, delivering high-quality products, managing supply chains effectively, and keeping customers satisfied are key factors that determine organization's success. The agricultural input sector, particularly the seed sector, faces unique challenges related to delivery lead times and sales return management, both of which impact efficiency and profitability. With increasing demand variability, climate uncertainties, and rising farmer expectations, optimizing lead time and minimizing delays in sales return processing have become vital for sustaining smooth operations and strong performance. This study focuses on identifying and recommending strategies to minimize the time taken for sales returns and optimize delivery lead times in the agricultural input supply chain. The research highlights the role of advanced technologies such as predictive analytics, real-time inventory tracking, Automated inspection and work flow and route optimization systems. Additionally, it emphasizes the importance of customer feedback mechanisms, centralized return processing centres, and streamlined communication systems. The findings suggest that integrating technological innovation with efficient operational strategies can significantly enhance supply chain responsiveness, reduce wastage, and improve customer satisfaction. The study contributes to agribusiness management by offering practical insights for improving efficiency, strengthening farmer relationships, and achieving sustainable competitive advantage.

Keywords: Lead time optimization, sales return management, seed distribution, supply chain, Garrett ranking

1. Introduction

The agricultural sector plays a pivotal role in global food security and economic stability, contributing significantly to employment and GDP, particularly in developing countries like India. Despite ongoing urbanization, industrial growth, and shifting economic paradigms, farming continues as the primary source of income and livelihoods for millions, particularly across rural areas. According to the Periodic Labour Force Survey (PLFS) July 2023 - June 2024, conducted by the National Sample Survey Office (NSSO) under the Ministry of Statistics and Programme Implementation (MoSPI), 46.1% of the workforce in India is employed in the agriculture sector. Further, as per the National Accounts Statistics 2025, this sector contributed approximately 17.8 per cent of the country's GDP for FY 2023-24 ([Press Information Bureau, 2025](#)) [4]. Within this sector, the agricultural input industry including seeds, fertilizers, and agrochemicals forms the backbone of productivity and crop performance.

Lead times play an essential role in the agricultural industry, particularly concerning the procurement and distribution of essential inputs such as seeds, fertilizers, pesticides, and machinery. Lead time is the duration between the initiation of an order and the receipt of the corresponding input, and lead times significantly influence the efficiency and cost-effectiveness of agricultural supply chains. The management of lead times aim at minimizing delays, costs and saving time. Reducing lead time is often a priority for businesses, as shorter lead times can improve inventory management, enhance customer satisfaction and reduce stock outs. Regarding inventory management, lead time is required to keep the inventory running correctly. It's an essential hallmark of a well-functioning inventory management system. Stock run out, and customers' orders can't be fulfilled if lead timings aren't controlled properly. Poor order management cost a business a lot of money by costing it valued customers and damaging its brand.

When lead times get out of control, a vicious cycle start, with lead times getting worse as demand increases. This gap between customer orders and manufacturing may result in further delays, making the lead period worse. In the agricultural industry, sales return management is closely related to inventory management and supply chain logistics. In the agribusiness sector, unsold seed returns are typical, with the independent dealer bearing no risk for returned seed since the supplier covers the costs of returning the unsold seed. In the agricultural supply chain, sales return management is crucial for handling returned agricultural inputs, including machinery, fertilisers, pesticides, and seeds (Burer *et al.*, 2008) [1].

1.1 Importance of minimizing time taken for Sales Returns and optimizing delivery lead times.

Sales Returns are an inevitable aspect of business operations. Effective management of these returns is essential for both satisfaction of customers and operational efficiency. Seeds returned within the standard 90-day window are carefully stored to ensure their viability and potential for reuse. However, challenges arise when seeds from other states are returned after this timeframe. Delays in receiving these returns can lead to a decline in seed viability, limiting their reusability. This analysis explores strategies to minimize the time taken to process sales returns.

For firms in the seed industry, optimizing delivery lead times is crucial. It directly impacts customer satisfaction (Darko *et al.*, 2018) [3], operational efficiency, and competitive advantage. Timely delivery ensures that seeds reach farmers at the optimal planting times, minimizing the risk of missed opportunities that can result in lower crop yields. Moreover, efficient lead times reduce inventory costs and improve supply chain agility, enabling the firm to adapt more effectively to market fluctuations and customer demands. By optimizing lead times, seed companies can build stronger relationships with their customers, enhance their market reputation, and drive long-term business growth.

Moreover, in a competitive market environment, customer satisfaction acts as a key differentiator. Farmers today are more informed and demand not only high-quality products but also reliable service, timely delivery, and efficient grievance handling systems. Therefore, optimizing lead times and improving sales return processes are not just operational necessities but strategic imperatives.

This study aims to analyse the importance of minimizing the time taken for sales returns and optimizing delivery lead times in the agricultural input industry. It further explores strategic interventions that can enhance operational efficiency, reduce costs, and improve customer satisfaction, thereby enabling firms to achieve long-term sustainability and competitive advantage.

2. Materials and Methods

The current study was conducted in the plant located at Hyderabad and ten employees were interviewed with the particular goal of suggesting the strategies to optimize lead time management and sales returns management. The present study is descriptive in nature. A descriptive research design is the one which describes the affairs as it exists in present. It includes surveys and fact-finding inquiries of different kinds. This study is used to recommend the strategies for minimizing the time taken for sales returns and optimize delivery lead times.

2.1 Analytical Tools

Garrett's Ranking Technique

Garrett's ranking technique was employed to prioritize or rank the opinion of employees on factors responsible for adoption. Garrett's formula:

$$\text{Per cent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = rank given for i^{th} factor by the j^{th} individual
 N_j = number of factors ranked by j^{th} individual

3. Results and Discussion

In this study we have taken 07 factors into consideration. The respondents were asked to rank the factors as 1,2,3,4.....and so on till 07th rank according to their satisfaction level. Then the percent position of each rank will be calculated which will be converted into scores referring to the table given by Garrett and Woodworth (1969). For each factor, the scores of individual interviewees will be added together and divided by the total number of the respondents for whom scores will be added. These mean scores for all the constraints will be arranged in descending order; the constraints will be accordingly ranked.

Table 1: Factor-wise number of customers satisfied under different ranks

Factors/ Rank	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7
Streamlined Communication Channels	0	0	1	0	0	1	8
Automated Inspection & Approval Workflow	8	0	0	1	1	0	0
Centralized Return Processing Centres	0	7	2	1	0	0	0
Customer Feedback Loops	0	0	0	0	0	8	2
Advanced Forecasting Techniques	0	3	5	2	0	0	0
Enhanced Inventory Management	2	0	3	5	0	0	0
Optimizing Delivery Routes	0	0	0	1	9	0	0

From the table 1, it is noted that 8 people ranked Automated Inspection & Approval Workflow as first, one respondent ranked as four and one respondent ranked as five. Similarly, all the other factors were ranked by the employees as given in the table 1. The percent position of the 7 factors is calculated and different factors have shown different percent positions as depicted in the Table 2.

The Garrett values of the factors is calculated using the Garrett Ranking conversion table given by Garrett and Woodworth (1969). The Garrett ranking conversion table contains different values for different percent positions of the ranks. By using the percent position of a rank and the Garrett value can be calculated.

Table 2: Rank-wise Garrett values for different factors

Formula	Percent Position	Garrett Value
100(1-0.5)/7	7.142	78
100(2-0.5)/7	21.428	65
100(3-0.5)/7	35.714	57
100(4-0.5)/7	50	50
100(5-0.5)/7	64.285	42
100(6-0.5)/7	78.571	34
100(7-0.5)/7	92.857	21

These Garrett values are then applied to the rankings of the factors after which averages are taken and finally ranks were allotted to each factor. Different factors will be given different ranks according to the customer satisfaction level. It is observed from the table 3 that, Streamlined Communication Channels is ranked seventh which indicated that almost all the employees were satisfied with the Streamlined Communication Channels in the company. Hence, there are no changes required in streamlining the communication channels by the company. Customer feedback loops are ranked sixth showing that, customer feedback loops are being followed effectively across the company, there is still scope for further improvement to

make the process more efficient, responsive, and customer-centric. This shows that Continuous refinement in collecting, analyzing, and implementing customer feedback can help enhance overall customer satisfaction and organizational performance. The table indicates that optimizing delivery routes is already being followed effectively in the company, as 9 respondents selected this option. This shows that the organization is taking necessary steps to improve delivery efficiency. However, there is still room for improvement by adding more advanced features and strategies, which can further reduce delivery time and enhance overall operational performance.

Table 3: Ranking of factors based on Garrett scores.

Factors/ Rank	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	TOTAL	Average Score	Rank
Streamlined Communication Channels	0	0	57	0	0	34	168	259	7.41	VII
Automated Inspection & Approval Workflow	624	0	0	50	42	0	0	716	20.48	I
Centralized Return Processing Centres	0	455	114	50	0	0	0	619	17.705	II
Customer Feedback Loops	0	0	0	0	0	272	42	314	8.98	VI
Advanced Forecasting Techniques	0	195	285	100	0	0	0	580	16.59	III
Enhanced Inventory Management	156	0	171	250	0	0	0	577	16.5	IV
Optimizing	0	0	0	50	378	0	0	428	12.24	V
Delivery Routes										

Enhanced Inventory Management are ranked at number four indicating that this is followed to a lesser extent in the company and require further improvement. Strengthening these practices can help the organization maintain accurate inventory levels, reduce stock shortages and overstocking, improve coordination with suppliers, and ensure faster replenishment of products. As a result, the company can reduce lead times, improve operational efficiency, ensure timely delivery of goods, and increase overall customer satisfaction. Since advanced forecasting techniques are currently ranked third in importance, the firm still has significant scope for improvement in this area to further reduce delays and shorten lead times. The company should strengthen its forecasting system by adopting more accurate and region-specific demand prediction methods for seeds. Seed demand varies across different regions depending on factors such as climate conditions, soil type, cropping patterns, rainfall, government policies, and seasonal cultivation trends. Therefore, relying only on historical sales data may not be sufficient for precise forecasting.

By integrating machine learning algorithms, predictive analytics, weather forecasts, and regional agricultural data, the firm can better estimate the demand for specific seed varieties in particular regions and during specific seasons. For example, areas expecting higher rainfall may show increased demand for paddy or maize seeds, while drought-prone regions may require more resilient crop varieties. Identifying these regional demand patterns in advance enables the firm to maintain optimal inventory levels, improve production planning, and ensure timely distribution of seeds to dealers and farmers.

Improving forecasting accuracy also helps the firm avoid both overstocking and stock shortages, thereby minimizing storage costs and reducing the risk of unsold inventory. In addition, efficient demand forecasting enhances customer satisfaction because farmers receive the required seeds at the right place and at the right time. Thus, enhancing advanced forecasting techniques can significantly improve supply chain efficiency, operational performance, and overall responsiveness to market demand.

Since centralized return processing centres are ranked second in importance, there is a strong need for the firm to improve this area by establishing return processing centres regionally, near to key markets. Currently, the absence of nearby processing centres causes returned seeds to travel long distances before reaching the designated facilities, leading to significant delays in the return and inspection process. These delays affect inventory management, increase transportation time and costs, and slow down the restocking or replacement of seed products. By establishing centralized return processing centres in strategic regional locations, the firm can reduce the distance and time required for returned seeds to reach the centres, thereby speeding up inspection, sorting, quality assessment, and restocking activities. Dedicated centres equipped with skilled personnel and appropriate technology can efficiently handle returned seeds according to company policies, ensuring quicker turnaround times and better inventory control. This improvement will enhance supply chain responsiveness, reduce operational delays, improve customer satisfaction, and create a more efficient and flexible return management system.

Automated Inspection and Approval Workflow is ranked first in importance; it indicates that the firm should prioritize implementing this system to improve the efficiency and effectiveness of the seed return process. Currently, manual verification and approval procedures may consume more time, increase administrative workload, and create delays in processing return requests. By implementing an automated inspection and approval workflow, the firm can streamline the entire return management process by automatically verifying return requests against order records, return policies, and eligibility criteria. The system can instantly approve or reject requests based on predefined conditions, thereby reducing human error and accelerating decision-making. In addition, automated workflows can generate return instructions, shipping labels, and notifications to customers and dealers, ensuring faster communication and smoother coordination throughout the return process. This implementation will help the firm reduce processing delays, improve operational accuracy, enhance inventory management, and increase customer satisfaction by providing a quicker and more transparent return experience.

Table 4: Final Ranks allotted by customers according to their satisfaction level

Rank	Factors
Rank 1	Automated Inspection & Approval Workflow
Rank 2	Centralized Return Processing Centres
Rank 3	Advanced Forecasting Techniques
Rank 4	Enhanced Inventory Management
Rank 5	Optimizing Delivery Routes
Rank 6	Customer Feedback Loops
Rank 7	Streamlined Communication Channels

4. Conclusion

The company should focus on implementing automated systems to make the return process faster, more accurate, and more efficient. Centralized Return Processing Centres need to establish to reduce transportation delays and improve return handling. Advanced Forecasting Techniques and Enhanced Inventory Management highlighting the importance of better demand forecasting, inventory control, and seed planning to reduce shortages and delays. Optimizing Delivery Routes, Customer Feedback Loops, and Streamlined Communication Channels are already being followed effectively but still require some improvement.

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