

Transforming agricultural warehousing with AI: Challenges, benefits and cost considerations

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Representational image

AI (Artificial Intelligence) and ML (Machine Learning) have evolved into powerful drivers of change, weaving their way into both the fabric of businesses and the rhythms of our daily lives, all thanks to their groundbreaking innovations.

Every enterprise has recognized tasks suitable for digitization, including the agriculture warehousing sector, which is vital for post-harvest management. By adopting automated processes, this sector can significantly enhance crop safety, reduce costs, and improve commodity health. Innovations have emerged across all areas, from storage techniques to infrastructure design, while integrating scientific and technological expertise.

In agri-warehouses, automation can boost operational precision, optimize space usage, enhance logistical efficiency, and secure stored goods. This cuts back on errors, eventually leading to cost efficiency and enhancing the capability to meet industry demands.

Over the past decade, numerous AI-driven strategies have been implemented at various stages of the agricultural value chain, particularly during the post-harvest phase. Several AI applications have also been introduced to maintain the quality of agricultural products after harvesting.

Nonetheless, there are challenges associated with implementing these technologies in post-harvest management, including:

1. **High initial investment:** Significant financial resources are required for the implementation of AI technologies, covering infrastructure, software, and training. Consequently, smaller players in Agri-warehousing may struggle to secure the necessary funds, resulting in lower adoption of AI solutions in post-harvest activities.

1. **Need for expertise:** Effective operation of these technologies requires a skilled team with a thorough understanding of their implementation. This poses a challenge as warehouse management may need to either train current staff or recruit trained personnel, which could be difficult in rural areas with limited access to expert resources.

1. **System integration issues:** Many warehouses still utilize traditional post-harvest management systems and merging advanced AI solutions with existing methods can be complicated. Any discrepancies in data migration could disrupt workflows.

Despite these challenges, automation offers numerous advantages that can revolutionize post-harvest management, rendering it more organized, scalable, forward-thinking, and efficient.

Initially, technology-facilitated barcoded warehouse receipts for tracking commodities, but it has now evolved into comprehensive warehouse management systems based on ERP and similar platforms. With technology at its core, these advancements have helped mitigate issues such as food loss, waste, theft, and product quality deterioration.

Technological advancements aimed at the agri-warehouse industry:

1. **Predictive analytics & informed decision-making:** Technology enables the identification and analysis of potential threats, allowing warehouse managers to implement preventive measures proactively. AI can forecast market trends, demand shifts, and potential quality declines of stored goods based on both historical and real-time data, aiding managers in making informed commodity management decisions.

1. **Instant quality assessment & control:** AI and ML technologies offer various applications in the post-harvest stage. Predicting yield encourages farmers to maximize their efforts for optimal results, while quality assessments help them secure better prices for their crops. What was once done manually can now be executed instantly through AI-powered mobile applications.

1. **Surveillance-enabled warehouses:** Warehouses equipped with surveillance systems are transforming food grain safety. These "secured" facilities ensure continuous monitoring of food grains through a centralized command centre that adheres to established standard operating procedures (SOPs). With smart entry cards and timestamps, tracking incoming and outgoing grains is simplified. Predictive techniques can prolong the storage life of crops, and machine learning-based quality assessments can facilitate transparent pricing, benefiting both consumers and farmers.

However, a comprehensive cost-benefit analysis is essential to establish the optimal level of automation for each warehousing operation. The government can implement supportive policies and monitoring frameworks that promote the adoption of automation technologies in agricultural warehousing systems. Offering grants, subsidies, or low-interest loans to farmers and agribusinesses can further stimulate the transition to automated processes.

Thus, the ongoing evolution of technology and its integration into agricultural practices will be vital for addressing the persistent challenges of modern farming and ensuring economic sustainability.

Article to be attributed to Mr. Sandeep Sabharwal, Group CEO, Sohan Lal Commodity Management Limited.

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