

SMART WAREHOUSES

Reducing food losses through quality control and surveillance using over 30-50 sensors in a 1500 MT capacity warehouse.



World Food Programme

SAVING LIVES
CHANGING LIVES



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BACKGROUND

Rice, wheat, and millets are procured and stored by the Government of India to meet the requirements of the world's largest food based social protection systems namely, the Targeted Public Distribution System that serves over 800 million people; the Pradhan Mantri Poshan Shakti Nirman scheme, formerly known as the Mid-Day Meal Scheme, covering around 120 million school children; and the Integrated Child Development Services covering nearly 100 million pregnant and lactating/breastfeeding women and infants. The procured food grains are bagged and stored in conventional storage facilities owned or rented by the Government.

PROBLEM STATEMENT

Food grains losses in these warehouses occur due to the lack of real-time quality information which would allow for timely monitoring of warehouse conditions and preventive actions by warehouse authorities. Losses occur when insects, rodents, mites, birds, and microorganisms, consume the grain. Infestation causes increase in moisture, free fatty acid levels, and decrease in pH and protein contents resulting in loss of quality.

As the standard quality control approach, conventional Government warehouses measure and monitor the grain moisture content and infestation through periodical manual sampling and analysis of grain. However, this manual method has significant limitations, with scope for errors, delays, and mismanagement by functionaries, that may compromise transparency and reliability.

Addressing this storage loss has been a priority for the Government of India.

SOLUTION

To reduce the storage losses, WFP and the Department of Food and Public Distribution, Government of India have developed the SMART warehouse solution, using the Internet of Things technology to remotely monitor temperature, relative humidity, CO₂, air flow, fire/smoke, phosphine gas and oxygen and alert warehouse authorities about quantity and quality loss of foodgrains stored in conventional warehouses. This solution monitors critical events such as, unauthorised door access and rodent activities which helps to strengthen control and security measures by raising periodic alerts for timely corrective actions by the warehouse functionaries. About 33 to 40 sensors are deployed in a warehouse with capacity of 1500 Metric Tons.

So far, WFP India has deployed the SMART warehouse solution in 7 locations across India, covering both producing and consuming regions and different agro-climatic zones.

FEATURES

Single dashboard for all information



Live CCTV footage



Enabling safety and security



Real time alerts for preventative actions



Trend Analysis

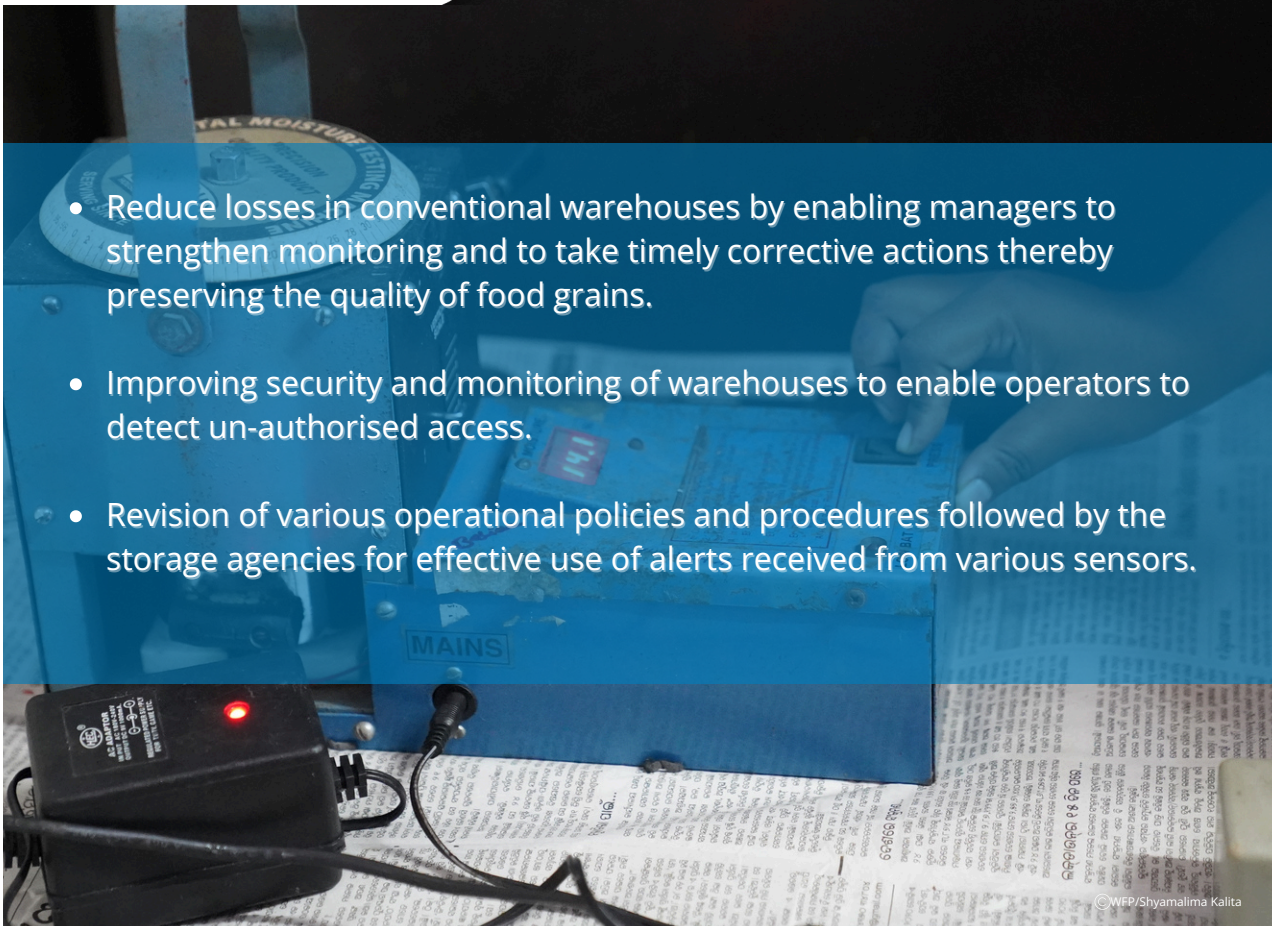


Capability of post incident report



BENEFITS

- Reduce losses in conventional warehouses by enabling managers to strengthen monitoring and to take timely corrective actions thereby preserving the quality of food grains.
- Improving security and monitoring of warehouses to enable operators to detect un-authorized access.
- Revision of various operational policies and procedures followed by the storage agencies for effective use of alerts received from various sensors.



RECOGNITION

Following the successful pilot, the Government of India has created a Standard Operating Procedure for SMART warehouses and recommended scale-up of the solution by the storage agencies, i.e., Food Corporation of India and Central Warehousing Corporation, in all the government warehouses that store foodgrains for longer periods.

This innovation has led to a shift in the government's quality control policy for conventional warehouses turned into SMART warehouses, from traditional grain moisture and infestation monitoring by warehouse staff to real-time ambient condition monitoring for actionable alerts.

The solution has improved quality control measures in the warehouse and enhanced transparency and accountability in the management of food stocks, reducing the potential for mismanagement.

The project is also generating long-term real-time data on various atmospheric parameters and on grain moisture content, grain quality and infestation etc, that can be used for storage research and for creating a robust real-time early warning system applicable to grains in diverse environments.

Existing brick & Mortar or MSUs can be converted to a SMART Warehouse

