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Inventory management practices followed for paddy seed under cold and warm storage conditions by the selected firm

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Abstract

This study focuses on firm of paddy seed business in the Kothur Medchal region and looks at how they use their warehouses and inventory management procedures. Warm and cold storage sections as well as other leased facilities are used by firm to handle its warehousing and processing operations. While the cold storage has a total capacity of 10,000 sq ft with 9,000 sq ft accessible, mostly for raw seed, the warm storage has a capacity of 21,000 sq ft, of which 15,750 sq ft are available for storing raw and processed seeds. These storage facilities are only used to 20–30% of their capacity during off-peak months, with full utilization occurring during peak periods and a large difference between lean and peak seasons. Tight protocols are followed during the receiving, processing, and storage of raw seeds, which are inspected for quality and kept in accordance with the first-in, first-out (FIFO) principle of inventory management. Processed seeds are temporarily kept in storage prior to being shipped to different distribution centers throughout India. The research emphasizes how the business uses SAP software for inventory tracking and dispatch, meticulous labeling procedures, and quality control measures that all help to ensure that paddy seeds are handled with efficiency.

This analysis sheds light on the operational dynamics of firm inventory management focused on increasing productivity, especially in the areas of cost-cutting, better logistics, and space use optimization.

Keywords: Paddy seed business, warehouse management, inventory management

Introduction

Seeds are crucial to agriculture as they form the foundation of crop production, leading to healthy, productive plants and better yields. Seed is the most vital, crucial and cheapest input in crop production. They preserve genetic diversity, allowing crops to adapt to changing conditions and resist pests and diseases. Through selective breeding and biotechnology, seeds can be enhanced for traits like drought tolerance and higher nutritional content. The seed quality and seed structure are the pioneer requisite during seed production (Ali *et al*, 2016) [1].

Paddy is the most important primary source of food providing nutritional support for more than half of the world's population, of which major consumers are from tropical and subtropical Asia. Paddy is a major cereal crop occupying second prominent position in global agriculture and its cultivation remains as a major source of employment and income in the Indian subcontinent as well as Asian continent, especially in the rural areas (IRRI, 2020) [4].

Inventory Management is regarded as a discipline concerned with optimal use of resources and for achieving overall operational efficiency across industries. Inventory management challenges such as delays in supply, stock-outs, and loss of production time are widely recognized by industry which continues to seeks optimal solutions to these issues. Highly efficient delivery systems and supply chain management have thus become imperative, particularly for large organizations, to ensure smooth, efficient and quality delivery of products and services. In the emerging environment when consistent customer satisfaction or service delivery has become a reason for an organization to stand apart from competition, the need for effective inventory management is largely seen more as a requirement than just a trend. All organizations have some level of inventory which must be properly administered because they represent capital (Pattnaik *et al*, 2020) [2].

Warm storage facilities are essential infrastructures designed to provide controlled environments for the preservation of various materials at elevated temperatures. Unlike conventional cold storage, which maintains low temperatures, warm storage maintains higher temperatures suitable for specific purposes such as preserving seeds,

incubating biological samples, or storing certain chemical compounds. These facilities play a crucial role in diverse fields including agriculture, biotechnology, pharmaceuticals, and environmental conservation. Warm storage facilities play a vital role in seed preservation, providing controlled environments conducive to maintaining the viability and longevity of seeds. These specifically designed facilities are required to store seeds at elevated temperatures, which is essential for the preservation of certain seed varieties (FAO, 2018) [3].

The present study investigates inventory management practices followed for paddy seed under cold and warm storage conditions by the selected firm. Which covers the practices followed for management of paddy seed in cold and warm warehouses.

Materials and Methods

The present study is descriptive in nature. A descriptive research design is one which describes the state of affairs as it exists at present. It includes surveys and fact-finding inquiries of different kinds. The researcher has no control over the variables. The researcher used this to assess the various inventory management practices carried out by select firm in cold and warm storages with regards to paddy seed.

Results and Discussion

Inventory management practices followed for paddy seed under cold and warm storage conditions by the selected firm

Paddy is an important crop in India and to see that paddy seed reaches the farmers in time for sowing, It is necessary to efficiently manage the inventory of the paddy seeds. Before dwelling into the efficiency measures related to inventory management practices followed by the selected firm, it is necessary to understand existing processes followed by the firm.

The study war restricted the warm and cold warehouses located in Kothur Medchal. Firm operates its warehouse and processing in leased properties. The one located at Kothur Medchal where the study is carried out as a warm storage area and cold storage which is leased out by third party where as the ware house of firm at Kandlakoya which consist of warm storage and processing plant as leased from another third party. For the facility of cold storage for the firm has an agreement with cold storages. Firm has separate warehouses for storing paddy, cotton and millet seeds in Hyderabad region.

The capacity and material stored in warm and cold storages in Kothur is shown in the table 1.

Table 1: Capacity and material stored in warm and cold storage of paddy

S. No.	Types of Warehouses	Total Capacity of Warehouses (sq ft)		Material Stocked	Net Available Capacity (sq ft)		Average Percentage of Utilization (%)
1	Warm Storage	21000	17000	Raw and processed seed	15750	11750	Peak season 100 percent
			4000	Inventory material		4000	Lean season 20 - 30 percent
2	Cold Storage	10000		Raw seed	9000		Peak season 100 percent
							Lean season 20 - 30 percent

From the table 1, which reflects the capacities of warm and cold storages, the material stocked and the percentage of utilization of each warehouse, it can be seen that out of the total capacity of 21000 sq ft of warm storage, the net available capacity is 75 percent which works out to 15750 sq ft. The other 25 percent of the warm warehouse space is left for gully's and office activities. In the available 15750 sq ft, 11750 sq ft is utilized for storing raw and processed seed and 4000 sq ft is used for storing packing material which will includes primary packing material, secondary packing material and chemicals which are used in processing of seed and other miscellaneous materials.

Out of the total capacity of 10000 sq ft of cold storage the net available capacity is 9000 sq ft. In the cold storage raw seed is stocked and very rarely processed seed is also stocked. The average percentage of utilization of warm storage is 100 percent during peak season which includes the months of April, May and June of Karif season and January, February of Rabi season. During the lean season that is the other months in the year the percentage of utilization of warm storage works out to 20 to 30 percent. The same in the case with cold storage, where in during peak season 100 percent of available is utilize and in lean season 20 to 30 percent available space is utilized.

Leasing expenses

In Kothur Medchal facility firm pays rupees 7.15 for every one kg of processed seed packed which includes the raw material storing and processing cost.

Table 2: Month wise lease expense

S. No.	Months	Total lease amount per month (rupees)
1	April	1371433
2	May	6224617
3	June	3232050
4	July	184041
5	August	1803187
6	September	701415
7	October	1113191
8	November	116474
9	December	156371
10	January	577062
11	February	4529060
12	March	4380412
	Average lease amount	2032443

Since the lease amount paid depends upon the volume of processed seed it is seen that during the months of May and February the lease amount was high compare to the other month of November. The average lease amount per month for the Kothur warehouse works out to rupees 2032443 during the year 2023-2024.

The steps followed in managing inventory by the firm are described here

Cleaning the premises

At firm clean maintenance of area is given lot of importance. Regularly cleaning activity is taken up to keep the work station clean and tidy. However, before the the peak season of arrival, a massive cleaning operation is conducted to prevent any contamination of the seed.

Inventory management practices of raw seed

As soon as the seed arrives at the point of unloading of the warm storage from framer fields in the gunny bags with serial number provided by the firm, the document provided by the lorry driver (bill of supply) is cross checked with the document mailed by the supply chain team. The bill of supply consists of details related to the particular lot. The details included are; farmers name, variety name, number of bags in specific variety, lot number, total quantity in each lot and value of raw seed. After verification the unloading of the material is carried out by the hamalis. At the time of unloading, physical count of the bags is made and the weight of each bag is checked before the uploaded material is stored in the warehouse. One kg of seed from each lot is collected and sent to lab for testing of moisture and other quality parameters. To accept the lot the moisture content according to the firms standards should by around 10-12 percent for paddy seed.

Labeling of arrivals

Before the raw seed is loaded into the transportation vehicles at the farmers fields, the bags are cleanly labeled. The details on the bags includes; variety name, number of bags in specific variety and lot number. The lot number which denotes the type of crop and serial number. For example RC600002351 indicates: RC - Rice Crop and 600002351 is the serial number.

Storage of raw seed in warm warehouse

Hamalis unload the material from the transportation vehicles and store in the designated space. The company follows the procedure that, all the material that arrives in a lot is stored at specified space. The material which is in 50 kg bags is stock in stepwise manner, where a particular variety is stocked in one place. After completion of the stocking of raw seed of different varieties received, placards are placed to identify a particular variety. The bags are stocked both horizontally and vertically in the alternative rows with maximum height reaching upto 10 ft a two feet gully is left between the material belonging to different lots, for differentiating between lots and for movement of labour.

The raw seed once received is stored in the warm storage whose temperature is maintained upto 20 degrees with relative humidity of below 60 percent for seven days. After seven days, if seed is not processed, the raw seed is shifted to cold storage where the temperature is maintained upto 4 degrees with relative humidity of 60 percent where it is stored for 30 days. In both the store houses relative humidity is kept at 60 percent to prevent moisture absorption which can lead to seed growth. Warm storage area is properly ventilated to maintain air circulation and to prevent relative humidity.

Table 3: Month wise arrivals of raw seed with product code (2023 - 2024)

S. No.	Month	Hybrid seed	Volume of raw seed stored (tonnes)
1	April	USRH 24	244.933
2	May	USRH 24	687.492
		USRH 26	313.924
		USRH 31	172.588
		USRH 01	123.659
3	June	USRH 01	309.764
		USRH 24	174.752
		USRH 26	45.897
		USRH 31	138.927
4	November	USRH 24	651.171
5	December	USRH 24	605.812
	Total	4 varieties	3468.92

(USRH - US Rice Hybrid)

From the table 3 it is noticed that more number of varieties and highest volume of seeds had arrived in the month of May, followed by June in which again arrival of four varieties of seeds can be seen as a total volume of 3468.92 tonnes. April marked the lowest arrivals formed by December and November. Hence it can be seen that May and June are the peak months for arrivals and volume of raw seed stored will also be highest during these months.

Storing of raw seed for export demand

The lot of seeds which are designated to be processed for export market are stored at a specific place and covered with tarpaulin covers, after fumigation the lot the stored for 7 to 14 days under these conditions depending upon the production plan. In total inventory of seed that is stored in the ware houses it is seen that 30 percent of seed is usually the seed that is bound for export market.

Entry of material received in the SAP

After checking physically the stock, the received material details are uploaded in the SAP software. The supply chain team mails an excel sheet containing the details of the lot they have sent to the warm warehouse. SAP notifies any discrepancies notified from the material details provided in excel sheet by the supply chain team from the data uploaded at the warehouse. If any errors are noticed in the physical stock, that stock is placed separately and the procurement team is informed immediately. The details entered in SAP include, the details of farmers from whom the seed material has been taken, lot number and number of bags with

weights.

Issue of raw seed for processing

Depending upon the order received and also based on the production plan the required variety of raw seed in required quantity is issued to the processing department following FIFO method i.e., the seed which comes in first is sent for processing first. One week before the seed is sent for processing, the seed is sent to lab for assessing various parameters of seed quantity. Only the seed which meets the quality standard is sent for processing.

Handling of raw seed storing in cold storage

Raw seed which is not processed for 7 days after the arrivals is sent to the cold storage. In the cold storage raw seed is stored for a maximum period of 1 month. In cold storage quality test are conducted every fortnight to check the various parameters of the seed. Once an order is received, the required amount of raw seed is issued to the warm storage following FIFO method. The raw seed that is taken out from the cold storage is stored in the warm conditions for a minimum period of two days and maximum period of seven days to bring the seed to the the required moisture level for processing. After testing the seed, if the seed meets the quality standards set, the seed is sent for processing.

Inventory management of work in progress material

The production unit processes 30 tonnes of seed per shift of eight hours. During the peak season the production unit runs in two shifts. The raw seed that is once issued to the processing unit is stored in the processing unit till it is processed.

Inventory management of processed seed

The processing and packaging of seed takes place in a sequence, on the machinery which are arranged in succession. As soon as the processing and packaging of the seed is done, it is moved to the space near the out gate of the warm storage. The paddy seed is packed in primary bags of one kg and three kg according to the requirement of the market. However the variety US 312 Gold is always packed in either 0.9 kg or 2.7 kg packets as this variety is send to Nepal.

Table 4: Processed seed stored month wise (2023 - 2024)

S. No.	Month	Product code	Volume of processed seed (tonnes)
1	April	US 382	81.15
		TH 88	122.625
		US 312	18.66
		Total	222.44
2	May	US 312	283.590
		US 380	107.910
		US 312 GOLD	158.706
		US 362	254.280
		Total	804.49
3	June	US 382	190.555
		US 88	261.480
		Total	452.04
4	July	Quadra Alas	25.740
		Total	25.74
5	August	TH 82	174.724
		Quadra Alas	14.050
		US 88	63.420
		Total	252.19
6	September	US 88	98.1
		Total	98.1
7	October	TH 82	103.095
		Quadra Alas	52.596
		Total	155.7
8	November	US 380	162.9
		Total	162.9
9	December	US 7711	21.87
		Total	21.87
10	January	US 380	80.71
		Total	80.71
11	February	US 362	66.18
		US 88	358.845
		TH 82	208.41
		Total	633.43
12	March	TH 82	391.545
		US 312	22.110
		Total	413.65
		Total volume per year	3323.26

From the table 4, it can be seen that highest volume of seeds was processed since during in the month of May with amount to 804.49 tonnes. The volume of seeds processed in May amounts to 24.2 percent of total seed processed during the year. The second volume highest of seed was processed during the month of February which accounted to 633.43 tonnes and 19.06 percent of the total volume of seeds was processed during the year. The other months in descending order of volume of seeds processed 452.04, 413.65, 252.19, 222.44, 162.9, 155.7, 98.1, 80.71, 25.74, 21.87 tonnes which form 13.6, 12.4, 7.5, 6.7, 5, 4.7, 3, 2.4, 0.7, 0.65 percent of total volume seed processed during the year 2023 - 2024 respectively. The processed seed which is bound for domestic market is packed in secondary packages of 30 kg, where as the seed that is bound to be sent for export market is packed in 15 kg secondary bags. Usually the packed seed is not store for more than 30 days in the warm storage. Production is carried out based upon the orders and holding of packed seed for longer periods is not observed.

Loading of packed seed

The packed seed which is in 30 kgs bag is sent to the distribution hubs according to the orders received from them, by engaging third party transporters. The vehicles that are used for the transport will selected based upon the quantity that is to be sent to a particular distribution hub.With in the state of Telangana, the small orders from dealers (less than 100 kg) are sent through courier, since the warm storage at Hyderabad also acts as the distribution hub for Telangana.

Table 5: Location of distribution hubs of the select firm

S. No.	Location of distribution hub	Area	Name of C & F agent
1	Gujarat	Vyara	Khedut Agro Agency
2	Madya Pradesh	Satna	Singrauli Fertilizers
3	Jharkhand	Ranchi	Balajee Traders
4	Chattisghar	Ambikapur	Star Sales Corporation
5	Bihar	Patna	Krishna Seeds
6	Odisha	Orrisa	JP and Sons Umerkote
7	Harayana	Hissar	Shanti Fertilizers and Chemicals
8	Kolkata	Calcutta	Greenlinks
9	Maharashtra	Pune	Phoenix Supply Chain Solutions Pvt Ltd
10	Uttar Pradesh	Lucknow	Balajee Agri Sales and Services

From the table 5 The distribution hubs are located across various states in India, each managed by C & F agents. In all apart from the one in Hyderabad, the firm 10 distribution hubs. From the warehouses in Hyderabad the processed and packed seed is distributed to various distribution hubs located in the country.

The documents that are generated while dispatching the material to the distribution hubs or dealers include SAP invoice, LR and gate pass.

Uploading dispatch details in SAP

As soon as the material is ready for dispatch the details like lot number, LR number, address of the distribution hub are entered into the SAP. Based on the already entered data in SAP during arrivals and processing of seed, SAP generates an invoice consisting of various details. The details that are included in the invoice are; address of delivery point with GST number, SAP invoice number, transporter details, date of dispatch, lot number, product packed date and expiry date, number of bags, total number in packets and total weight, rate per unit and net amount. A copy of invoice generated is given to the driver of the vehicle dispatching the material and gate pass is also issued to the security. Before the vehicle leaves the premises of firm the security personnel will check the material to see, whether the load matches with the details mentioned in the gate pass.

Conclusion

The study offers a thorough analysis of the inventory management procedures used by a particular organization for both warm and cold storage of rice seed. The company uses a number of leased premises for its warehousing and processing operations. Different crop seeds, including paddy, are stored in separate facilities. The analysis demonstrates how well the company uses its storage capacity, utilizing almost all of it during busy times and much less of it during slow times. Protocols for cleaning storage spaces, thorough inspections of incoming seed lots, labeling and arranging raw seed storage in an orderly manner, and the methodical switching of seeds between warm and cold storage to preserve quality are all important inventory management techniques.While FIFO (First In, First Out) techniques are used to effectively manage raw seed processing and delivery, the usage of SAP software guarantees accurate inventory tracking from arrival through processing and dispatch.

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