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Traditional grain storage practices in India: SWOT analysis

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ABSTRACT

Storing of grains is of prime importance to avoid social unrest, seasonal variation, to provide seeds for next planting season, prevent deterioration and ensure food security in the country. India's food grain production is around 257 million tonnes (2014–15) and an additional 150 million tonnes has to be produced by 2040 to feed almost 1.5 billion people. Thus, the campaign for higher production of foodgrain and reduction in storage losses has to continue with increased efforts. About 65–70% of total food grains produced in the country is stored at farm level in traditional structures like *Bakhara*, *Kanaja*, *Kothi*, *Sanduka,* earthern pots, and *Gummi*. These indigenous storage structures are suitable for storing grains in their region specific conditions. About 6.0 to 10% of total production food grains are damaged due to moisture, insects, rodents, fungi, exposure to rains, floods and negligence. According to an Indian study of grain storage practices, 41.5% of farmers are using gunny bags, 18.1% using bulk storage in rooms, 11.1% using metallic bins and remaining 30.0% stored grains in other traditional structures made up of local materials like storage baskets made exclusively of plant materials, calabashes, gourds, earthenware pots, jars, solid wall bins, underground storage, wooden/ mud structures. Here it lays the significance of improved storage structures for specific regions, which provide safer and economical means of grain storage for long durations. If a farmer stores the grain properly, he should be given some incentive apart from normal government price. This ultimately would lead to reduced losses at farmers level, which subsequently would reduce the pressure on storage space with the Food corporation of India (FCI), central and state warehousing corporations which are still running short of 45 million tonnes storage capacity. This paper discusses in detail the existing grain storage practices being followed in India and critically presents the strengths, weaknesses, opportunity and threat involved in the traditional storage system.

Key words: food grains, Storage structure losses, Traditional storage

India produced record 265.04 million tonnes (MT) of foodgrains in the year 2013–14 followed by around 257 million tonnes in 2014–15 with advances in technology, better seed varieties and good monsoon. However, despite making huge strides in production proper storage facility and capacity are not adequate to reduce storage losses that are incurred annually to national food grain inventory. The Central Institute for Post-Harvest Engineering and Technology CIPHET, Ludhiana, Punjab, in a national level study reported losses of 4.65 to 5.99% in food grains at different post-harvest stages during 2014–15 (Jha et al., 2015). This amounts to around 16 million tonnes of food grains that are lost every year. Singh (2010) reported the monetary value of the losses amounts to more than ₹ 50, 0,000 million per year.

Indian Government fixes a minimum support prices for different food grains every year, and guarantees the farmers to buy their produce at this price if they fail to sell in market. The government buys food grains from the farmers and distribute them later at ration shops, but does not have adequate space to store the grains. The Food Corporation of India (FCI) has insufficient number of grain silos (modern storage

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facilities), and covered godowns with adequate storage capacities. However, farmers hold about 65% of the total produce of food grains for their consumption and use. The percentage of overall food crop production retained at the farm-level, and the period of storage is largely a function of farm-size and yield per acre, family-size, consumption pattern, marketing pattern, form of labour payment, credit availability and future crop expectations (Greeley, 1978). Traditional grain storage practices at village farm level are followed, which are often crude and unscientific.

Foodgrain is stored in villages in different traditional storage structures and containers. The indigenous storage methods range from mud structures to modern bins. Traditional grain storage plays an important role in preventing losses, which are caused mainly due to weevils, beetles, moths and rodents (Kartikeyan et al., 2009). The containers are made from a variety of locally available materials, differing in design, shape, size and functions according to agro-climatic conditions (Kanwar and Sharma, 2003). The materials used include mud, bricks, cowdung, paddy straw, wheat straw, bamboo, reeds, wood, etc.

Grains are stored in different ways–indoors, outdoors or even underground (Channal et al., 2004). *Kanaja* is an underground grain storage container made of bamboo. The base is usually round and has a wide opening at the top. The height and capacity varies. The *kanaja* is plastered with mud and cowdung mixture to prevent spillage and pilferage of grains. The top is also plastered with mud and cowdung mixture or may be covered with paddy straw or gunny bags. Also, wooden boxes known as *sanduka*, are usually used for storing smaller quantities of grains, pulses, seeds. Storage capacity of these boxes may vary from 3 to 12 q. Partition walls may also be made inside the box to store two to three types of grains simultaneously. A big lid on the top with a small opening enables taking out the grains. To protect the grains from moisture, the box is kept 12 inches (about 30.5 cm) above the ground level with the help of stands/legs. The box has to be regularly polished for its maintenance. *Kothi* is another storage structure used to store paddy (*Oryza sativa* L.) and *jowar* or sorghum [*Sorghum bicolor* (L.) Moench]. A room with a large door is built for pouring grains. Grains are taken out from a small outlet. Similarly, earthen pots are indoor storage containers for storing small quantity of grains. These are made locally using burnt clay and are of different shapes and sizes. The earthen pots are placed at the floor level. They are arranged one above the other and known as *dokal* (Channal et al., 2004).

STRENGTHS

India being the second largest producer of food grains and given the meager storage capacities available with public and private stakeholders, traditional storage practices have grown as major storage option in India. Today, farmers store around 65% of total produce of food grains at home or farm, using traditional methods for their consumption and further use as seed. These traditional methods of foodgrain storage are time tested and have evolved over time to avoid losses that occur due to insect and pest infestation. Evolution of traditional storage practices has taken place in accordance to the diverse agro-climatic conditions prevalent in India. Traditional storage structures have varying designs, materials and capacities suiting different agro-climatic regions. It enables foodgrain storage at pan India level, besides helping against any imminent collapse of food-supply system in advent of any natural calamity.

In order to meet the requirement of feeding 1.5 billion mouths, there is a perpetual endeavour to enhance the grain production with efforts to exploit high potential of increasing productivity and crop area. The potential to have bumper harvests in future although necessitates to bolster public and private investment in organized storage sector, however, traditional storage practices have acted as a buffer in the event of non-availability of such facilities. Also, traditional storage has helped in preventing over-burdening of the already scant facilities in organized sector. Besides, easy availability of agricultural by-products as raw materials structures facilitates and encourages employing traditional methods for grain storage. This helps in reducing storage costs, better utilization of by-products, and disposal of wastes. Moreover, local artisans develop such structures depending on storage requirement, availability of space and raw material.

WEAKNESSES

Traditional storage practices have significantly contributed in protecting the food grain stocks at farmer's level, but the practices are rife with inadequacies and there are substantial limitations in projecting these practices as solution to all storage problems. The meager capacity of traditional storage structures available in comparison to overall food grain production is one of the main concerns that limit the possibility of safe and economical grain storage at farm level. Farmers sell their produce at lower prices for not being able to store grains due to storage capacity constraint. This leads to a glut in the market, forcing

government agencies to intervene and buy food grains eventually to strain its own resources and already inadequate storage facilities.

The non-uniformity in the quality of traditional storage structures due to lack of established quality standard leads to variations in the quality parameters of stored food grains. This results in lower returns for some food grains wherein same effort had been made for storage. Besides, traditional storage structures are prone to rodent attacks necessitating regular watch by the farmers. Moisture migration inside traditional storage structures is another concern and may cause severe spoilage if proper care is not taken to avoid it.

The spatial mismatch between production and storage is another concern that limits the use of traditional storage structures (Sawant, 1994). Even if structures are made at farm level food grains are prone to theft. This, sometimes discourages the farmers to invest in farm-level structures, as there are no provisions to check stealing from farms. Besides, the inability to identify or reduce the difference in quality of grains also hampers the use of traditional storage structures as it may lead to deterioration of grain.

Low level of marketability of stored grains after making efforts for their storage for long duration is another reason that dissuades the farmers from using and advocating the use of traditional storage structures. The fragmented land holdings make it difficult and uneconomical for farmers to invest for storage and instead sell their produce at lower prices. Many a times they have to buy back the grains for their consumption and seed purpose subsequently.

The low level of the supply chain integration makes it difficult to sustain the whole idea of small farm level or domestic storage of foodgrains by farmers. The missing links in the chain until ratified, would keep on discouraging the farmers from picking up on traditional storage practices at a more enthusiastic and integrated manner.

OPPORTUNITIES

Although there are certain limitations with the traditional storage practices for food grains, they could turn into opportunities with proper intervention. The decreasing size of land holdings has made traditional storage structures highly relevant. Farmers can construct small structures for their smaller produce and avoid selling at lower prices and buying back at higher prices later. It is also possible to take up large-scale production of traditional storage structures, as the raw material is readily available and low expertize is needed for the same. Further, there is possibility in improving the design of traditional storage structures given availability of scientific know-how and new improved materials. Problems like moisture migration, rodent attacks, and variation in grain quality can be minimized with simple scientific interventions. The idea of organic storage could easily be taken up at traditional storage level with a little scientific intervention.

Traditional storages could positively influence the possibilities of forming producer groups and cooperative structures at village level or in production catchments. This would further strengthen the traditional practices and make them more economical and profitable to the farmers. The development of rail networks and improvement of quality of roads for better transportation offer increased opportunities to farmers for employing traditional storage methods. It helps in eliminating the over-dependence on middlemen, agents or big business houses. Traditional storage practices could also prove pivotal in balancing price fluctuations and restoring the continuity of raw material flow from a producer to a processor.

THREATS

The decrease in the international prices of food grains may pose a threat to the traditional storage practices if a relevant economical model is not created that pours food grains at competitive prices into the market. The increase in prices of production inputs like plant protection, fumigants etc. presents another constraint in developing a remunerative system of traditional storage. Besides, the growing trend of alternate use of grain, e.g. bio fuels, reduces the grain supply for consumption purposes thereby threatening the importance of traditional storage methods. Rural people feel that traditional storage structures are fixed, require regular maintenance and need local skilled persons for their construction, whose number is decreasing day- by- day. Moreover, improved grain storage structures are also status symbol for the rural family. The decrease in consumer demand for products of processed grain is another concern that would need some attention.

CONCLUSION

Many rural farm families use traditional knowledge for constructing grain storage structures and use traditional storage practices at household and farm level, to meet the demand of food, feed and seed. With the advent of modern improved storage structures, changing international agricultural business scenario,

and varied consumer demands, the practicality and economic feasibility of traditional storage structures need to be ascertained. The easy availability of raw material from agricultural by-products, low-priced labour, traditional knowledge and limited access to improved warehousing drive rural farmers towards traditional storage practices. However, there are limitations that question the idea of storage by traditional methods in rural areas. Nevertheless, given the massive gap between production and modern storage capacity, it is imperative to encourage and improve the traditional storage practices. It offers many opportunities given the infrastructural constraints with public as well as private stakeholders. The need of the hour is to bolster traditional storage methods with modern inputs and to provide cost-effective storage structures to farmers, so as prevent enormous storage losses on one hand and strengthen national food security on the other.

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