

## Agricultural Storage Infrastructure in India: An Overview

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**Abstract:** India holds the second largest agricultural land in the world with approximately 179.9 million hectares under cultivation. The country has emerged as a major player in agriculture in the global scenario. Agriculture accounts for 14% of GDP and 11% of India's total exports. In FY 2013, total food grains production in India reached an all-time high of 263.3 million tonnes (MT). Rice and wheat production stood at 105.3 MT and 94.9 MT respectively. The government buys food grains from the farmers but does not have the space to store it. The food Corporation of India (FCI) has insufficient number of grain silos (modern storage facilities), and covered godowns with adequate storage capacities. Hence grains are stored in outdoors under CAP storage (Cover and Plinth) across the country. This makes grains prone to rodents, moisture, birds and pests. Unexpected rainstorms and weather makes matters worse. Every year tonnes of food grains go waste because of inadequate storage and infrastructure facilities. The wastage of fruits and vegetables is even higher than grains. Therefore, food logistic chain in India needs huge investment in providing proper storage facilities. Storage infrastructure is necessary for carrying over the agricultural produce from production periods to the rest of the year and to prevent distress sales. The warehousing capacity available in India, in public, cooperative and private sector is about 94.526 million MTs and as per Government's estimates, additional 35 million MTs warehousing capacity is required during the 12th Five Year Plan period for the storage of all major crops. In the current year budget announced by the finance Minister, an allocation of 5000 Cr INR has been made for Warehouse infrastructure Fund, keeping in view the urgent need for availability of scientific warehousing infrastructure. Recently, private sector participation in Agriculture warehousing has also increased, making this segment more competitive but lots more needs to be done. The objective of this paper is to summarize the issues and challenges facing the agricultural warehousing, especially in the food grains storage facilities sector and attempt to find possible solutions. The study is based on secondary data available on the current demand and supply scenario in the backdrop of key Acts/Policies in the sector.

**Keywords:** storage infrastructure, demand and supply, potential, challenges.

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### I. Introduction

A grain saved is a grain produced. These golden words remain as a mere proverb when one visualises the quantum of post-harvest wastages and losses of agricultural produce due to inefficient supply chain management. The reason for such huge post-harvest losses mainly attributes to lack of scientific storage facilities and improper transportation, poor front end infrastructure, such as inadequate warehousing facilities, redundant food processing technology and farmers' inaccessibility to value-added services.

It has been estimated that about 65% of their total produce are held by the farmers for their consumption and use which is stored in a crude and unscientific method. The balance quantity is supplied to the central pool and delivered at the nominated warehouse or at the local mandi earmarked for procurement or delivery. The procurement agency collects the quantity deposited to the central pool by the farmer and transports the same to the FCI or nominated warehouse. Often the stock stored in the warehouses remain in storage for more than its shelf life due to want of off-take of stock by allottees like Targeted public distribution system (TPDS) and flour mill owners. Such long storage, if not taken proper care of, causes damage to the stock. Since the stock stored in the warehouse is not lifted, the storage space cannot be utilized for fresh arrivals of the ensuing season.

For want of covered storage space, FCI and other storage agencies are resorting to CAP<sup>1</sup> storage (Open storage) of food grains that too without following the norms for such grain storage. As per the scientific storage policy laid down for open storage, the stock is required to be turned over every six months and under no circumstances should food grains be stored under CAP cover for more than a year.<sup>2</sup>

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1Report of working group on warehousing development and regulation for the twelfth plan period (2012-17) by Planning Commission, GoI

2Information provided by Mr KN Mohanan, Head- Audit and Surveillance, Edelweiss integrated Commodity Management Ltd, Mumbai

With the advent of Container Freight Stations (CFS), Bonded Warehouses and Industrial warehouses, the private participants and investors on Agricultural Warehousing including PSUs, are diverting their resources to such economically more attractive and viable options. Private sector intervention should be encouraged by soft loan facilities for construction of agricultural godowns at potential locations and provide subsidy and tax incentives to such entrepreneurs. Perhaps, such positive approach from the part of the planning commission and recommendations of the inter-ministerial committees of the Govt. may go a long way to narrow the gap between production and storage requirements and feed thousands of poverty ridden human population. Government is planning to take steps to utilize vacant government land with railways and other government agencies. As a part of this initiative, a joint venture between CWC and IR has resulted in and Rail side Warehousing Company limited which is constructing godowns at selective railheads.

## **II. Literature review**

The problem of wastage of food grains in a country like India where 22 percent<sup>3</sup> of Indians fall below the official poverty line is nothing but criminal. Even with less than 60% crop yield, the storage capacity in the country is woefully short. As in June 2011, FCI was holding 65.5 million MT of wheat and rice against the buffer and strategic norms of 31.9<sup>4</sup> million MT of food grains. This is against the backdrop of an increased production of principal food grains to 263.2 million MT in 2013-14, an increase of 23.5% during the decade. With increased procurement of food grains by Food Corporation of India (FCI), the principal agency entrusted with the task of feeding the millions of Indians, the storage losses also have increased. The losses are due to both non-availability of covered storage facilities with the agencies and also due to poor management of available storage at the farm level and the organized storage levels.

The post-harvest losses in India amount to 12 to 16 million metric tons of food grains each year, an amount that the World Bank stipulates could feed one-third of India's poor. The monetary value of these losses amounts to more than Rs.50,000Cr per year(Singh, 2010).Ramesh (1999) reported that high wastage and value loss are due to lack of storage infrastructure at the farm level.

As per estimates available, the storage gap in warehousing capacity in the next 5 to 10 years is around 35 million MT. There is therefore a need of not only sufficient modern warehousing capacity but also ensuring scientific storage methodology to be followed in the storage facilities existing.

## **III. Objective**

The objective of this paper is to provide an insight into the issue of storage of food grains in the country, the losses which are occurring due to non-availability of proper covered storage and the scientific storage practices which are being flouted in some cases due to which millions of tonnes of food grains are wasted. The motivation to carry out research in this area has been because of a study by the London based Institution of Mechanical Engineers on global food wastage which found that in India, about 21 million MT of wheat is wasted each year due to inadequate storage and distribution systems<sup>5</sup>.

## **IV. Methodology**

The research is basically based on secondary data available in the electronic information domain and various studies carried out like the Comptroller and auditor General of India report on storage management and movement of food grains in FCI, report of the Working Group on warehousing development and regulation for the 12<sup>th</sup> plan year by Planning Commission, GoI etc. The paper tries to analyze the issues in the food grain storage sector using facts and figures and recommend possible solutions.

## **V. Discussion and analysis**

### **5.1 Food wastage in India**

As per FCI reply to a query sought by an RTI<sup>6</sup> activist in February 2014, as much as 1.945 Lakh MT of food grains was wasted in India between 2005 and March 2013. It also said that of the damaged stock, around 84% was rice and 14% wheat. Punjab accounted for nearly 50% of the damages with Maharashtra accounting for 10% of the total loss. The Honorable Supreme Court in its order<sup>7</sup> dated 27<sup>th</sup> July 2010 had observed, inter-alia, that: "...In a country where admittedly people are starving, it is a crime to waste even a single grain...all out efforts must be made that not a single grain is wasted...."

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3Poverty estimate based on mixed recall, data.gov.in, an open government data platform accessed on 21 Jan 2015

4Report of working group on warehousing development and regulation for the twelfth plan period (2012-17) by Planning Commission, GoI

5Global food waste not, want not – Institution of Mechanical Engineers

6FCI admits 1.94 LMT food grain wasted between 2005-13 – The Hindu, February 12, 2014 accessed on 30 September 2014

7Report on excess food grains in the godowns of the FCI and State civil supplies corporations by Dr NC Saxena, Commissioner and Harsh Mander, Special Commissioner of the Supreme Court in the case: PUCL Vs UOI & ORS. Writ Petition (Civil) No.196 of 2001 dt 10 August 2010

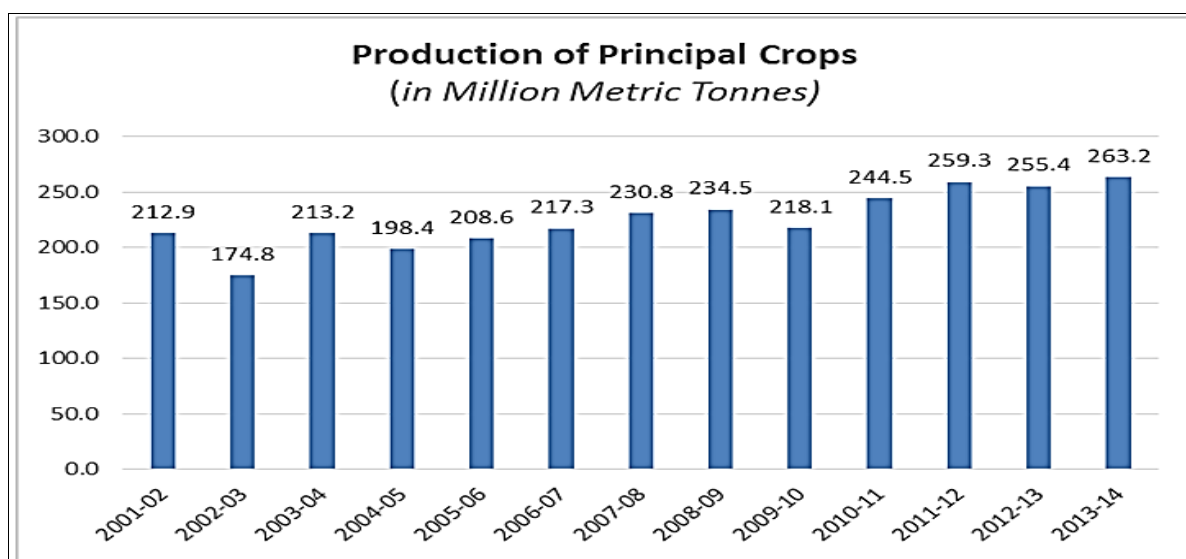
## 5.2 Food grain production in India

The agricultural sector in India accounts for about 16% of GDP and 10% of export earnings. India's arable land area of 159.7 million hectares (394.6 million acres) is the second largest in the world, after the USA. Its gross irrigated crop area of 82.6 million hectares (202.6 million acres) is the largest in the world. It ranks among the top three global producers of many crops like wheat, rice, pulses, cotton, peanuts, fruits and vegetables. In spite of these achievements, the crop yields in India are still around just 30% to 60% of the best sustainable crop yields achievable in the farms of developed countries. These are likely to be negated in the coming decades due to scientific and technologically improved crop production measures which would increase the quantity of food grains harvested and therefore the storage requirement would further increase.

About 65-70% of the total food grains produced in India is retained by farmers for their self-consumption or meeting their other financial requirements. The food grains at farm level are stored in traditional as well as in modern storage structures. Food grains are stored in bulk in these storage structures, which are neither rodent proof nor moisture proof. There are estimates that substantial quantity of food grains (about 6.0% to 10% of total production)<sup>8</sup> are damaged in these storage receptacles due to moisture, insects, rodents and fungi and also due to transportation.

After harvest, the grains are stored at three different level<sup>9</sup>:

- ✓ Producer's or farmer's Level
- ✓ Trader's or private rice millers Level
- ✓ Urban Organizational Storage Level for the central pool by FCI, State government agencies (SGAs)



**Fig 1.** Agriculture production of principal crops in India (Sources: 1. Directorate of Economics and Statistics, Ministry of Agriculture, GoI, 2. Agri Logistics/Warehousing Opportunities and Challenges By BB Patnaik, MD, CWC)

## 5.3 Operational framework of food grains management

FCI is the only government agency entrusted with movement of food grains from the procuring states to consuming states through a network of storage infrastructure owned or hired by FCI in the whole of India. These food grains are distributed by the state governments through TPDS and other welfare schemes (OWS). The food grains are also disposed of in the open market through sale under open market sales scheme (OMSS) to contain inflationary tendencies and generating storage space in the states. While four months requirement of food grains for issue under TPDS and OWS are earmarked as operational stocks, the surplus over that is treated as buffer stock and physically both buffer and operational stocks are merged intone and are not distinguishable.

For distribution of food grains under TPDS and OWS, the GoI makes monthly allocation of food grains to the states and UTs on the basis of their average annual offtake of food grains from the Central pool.

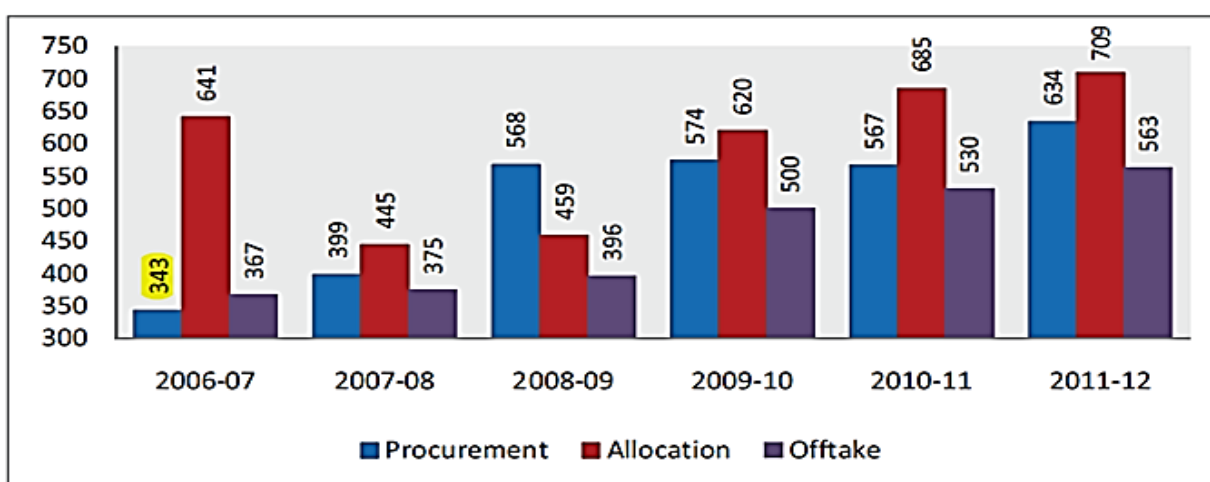
<sup>8</sup>Report of working group on warehousing development and regulation for the twelfth plan period (2012-17) by Planning Commission, GoI  
<sup>9</sup>Grain is in bulk storage – A status report by Richa Sharma (2014), National Institute of food technology entrepreneurship and management

Year	Rice (in Lakh Metric tonnes)	Wheat (in Lakh Metric tonnes)	Total (in Lakh Metric tonnes)
1990-91	117.4	110.6	228.0
1995-96	99.5	123.2	222.7
2000-01	189.7	163.5	353.2
2001-02	221.2	206.3	427.5
2005-06	276.5	152.7	429.2
2006-07#	-	-	343.0#
2010-11	342.0	225.1	567.1
2011-12	348.6	283.4	632.0
2012-13	338.5	381.5	720.0
2013-14	298.3	250.8	549.1
2014-15	105.9*	275.7*	381.6*

**Table 1:** Procurement of food grains for central pool (Source: Agri logistics/warehousing opportunities and challenges by BB Pattanaik, MD, CWC. Note –1.\* FCI report upto Dec 2014, 2. # - CAG performance audit report on storage management and movement of food grains in FCI)

The following is observed by the CAG report<sup>10</sup> in the procurement of food grains vis-s-vis allocation for the central pool:

- ✓ The total average *mandi arrival* during 2006-07 to 2011-12 for wheat and rice was **28%** and **39%** respectively.
- ✓ The total procurement of food grains for the central pool increased from substantially from 343 LMT in 2006-07 to 634 LMT during 2011-12.
- ✓ The average procurement of food grains for the central pool increased from **22%** (586 LMT) during 2006-07 to **32%** (1827 LMT) during the period 2008-09.
- ✓ An important observation in the CAG report was that the offtake of food grains by states and UTs against the allocation (for distribution of food grains under TPDS and OWS, the GoI decides the monthly allocation based on the average annual offtake of food grains from the central pool) by the FCI from its central pool ranged between **57%** and **86%** during the period 2006-07 to 2011-12.



**Fig 2.** Procurement, allocation and offtake of food grains (in LMT)<sup>11</sup>

- ✓ From the above figure, it can be seen that even though the procurement increased only marginally from 568 LMT to 574 LMT in 2008-09 to 2009-10, the allocation has increased substantially from 459 LMT to 620 LMT and the corresponding offtake was 396 LMT and 500 LMT respectively during the same period. This is leading to lesser storage space being made available for the stock of the ensuing season. Unless the stock allocated is lifted by the states and the UTs, the future stocks would be lying in the open which leads to losses.

#### 5.4 Storage management

Storage management is an important link in the whole system of procurement of food grains to its distribution for consumption. At the trader's level and urban organizational storage level, the foodgrains are

<sup>10</sup>Performance audit report on storage management and movement of food grains in FCI – CAG report 2013

<sup>11</sup>ibid

stored either in covered storage and open storage. In some cases, proper plinth is not provided, and in the other cases, dunnage is not provided and food grain bags are stacked directly on the ground causing huge damage of food grains. In some cases, the open storage is done in unprotected open ground without compound wall or fencing, resulting in lot of pilferage and damage by animals. Unless adequate storage structures as per the prescribed specifications are made available, the post-harvest storage loss cannot be curbed.

Even though FCI is the main government agency for the procurement and distribution of food grains held in the central pool, it is also responsible for the management of food grains in the central pool held by State government agencies (SGAs) and Decentralized procurement states (DCP). Due to increasing procurement of food grains from 2008-09 onwards, FCI has had to depend on hired space made available from CWC, SWC, SGAs and private parties as its own storage capacity was insufficient to accommodate the central pool stock of food grains. As mentioned earlier, the food grain stock is parked in covered godowns, silos and uncovered godowns called CAP.

The warehousing capacity available in India, with various agencies/sectors is as follows:

S No	Name of the organization/sector	Storage capacity in LakhMetric Tonnes (covered and CAP)
1.	Food Corporation of India (FCI)	156.40#
2.	Central Warehousing Corporation (CWC)	100.85#
3.	State Warehousing Corporations (SWCs)	234.61#
4.	State Civil Supplies	113.0*
5.	Cooperative Sector	150.7*
6.	Private Sector	189.7*
	<b>Total</b>	<b>945.26</b>

**Table 2:** Warehousing capacity available in India (Note- 1.# CAG report, 2.\* Report of working group on warehousing development and regulation for the twelfth plan period (2012-17) by Planning Commission, GoI.)

The storage capacity available with FCI including hired is as under:

As on 31 March	Covered			CAP			Grand total (in LMT)
	Owned	Hired	Total	Owned	Hired	Total	
2012	130.03	172.13	302.16	26.37	7.51	33.88	336.04

**Table 3:** Storage capacity available with FCI (including hired) Source: Monthly Performance reports.

With the increasing food grains stock in the central pool held by FCI and SGA excluding the DCP states, the storage gap with FCI has shown an increasing trend as given below:

Year	Central pool stock minus food grains procured by DCP states (in LMT)	Total storage capacity (owned and hired) available with FCI as on 31 March(in LMT)	Gap in storage capacity with FCI (in LMT)
2007	210.07	252.07	-
2008	298.89	238.94	59.95
2009	419.94	252.79	167.15
2010	468.72	288.36	180.36
2011	541.38	316.10	225.28
2012	667.89	336.04	331.85

**Table 4:** Gap in storage capacity with FCI (Source: CAG report)

Further, though the total food grains stock in the central pool increased from 457.82 LMT between 2006-07 and 2011-12, FCI increased its storage space through hiring or owned space only to the extent of 83.97 LMT (18%)<sup>12</sup> which is not commensurate with the increase in food grains stock level. Moreover, FCI's own storage capacity increased by a mere 4.07<sup>13</sup> LMT during the period 2006-07 to 2011-12.

Because of not having enough owned storage space, FCI's hired capacity increased by 80% from 99.74 LMT in 2006-07 to 179.64 LMT in 2011-12 which led to payment of 1,119.03 Cr INR in 2011-12<sup>14</sup>. Also since it could not take over stock of wheat procured by SGAs for the central pool within the prescribed time frame of June each year, even till the end of March of the following years, as much as 120.86 LMT of food grains remained un-lifted by FCI for which FCI had to pay carry over charges to the SGAs to the tune of 1,635 Cr INR

<sup>12</sup>Performance audit report on storage management and movement of food grains in FCI – CAG report 2013

<sup>13</sup>ibid

<sup>14</sup>ibid

in 2011-12<sup>15</sup>. The average annual expenditure incurred on hiring (including carry over charges) from 2008-09 to 2011-12 was to the extent of about 2,265 Cr INR<sup>16</sup>.

The storage policy of the GoI aims to achieve availability of storage capacity to meet the storage requirements for holding operational stock of food grains (four months requirement for TPDS and OWS) and buffer stock in different states as a measure of food security. The CAG report revealed serious imbalances in availability of storage capacity and huge shortage of storage space in consuming states:

- ✓ Out of the total of 336.04 LMT of storage space available with FCI, 64% was located in the large procurement states like Punjab, Haryana, Andhra Pradesh, Uttar Pradesh and Chhattisgarh whereas;
- ✓ Only 13% of the total capacity of FCI was with the consuming states of Rajasthan and Maharashtra
- ✓ The remaining capacity of 23% was being shared by the other 24 states/UTs

#### **5.4.1 Storage of food grains in open space**

Normally storage in open in the form of CAP is supposed to be resorted to during peak procurement seasons. The storage in the CAP should not be more than a year with at least one turn-over of the stock every 6 months to retain the quality of the food grains. Further, for proper aeration, the cover is to be removed at least 2 to 3 times in a week.

Unfortunately, lot of stock is lying in the open where even the plinths are not available<sup>17</sup>. During procurement season, for want of adequate CAP storage facilities, stocks are simply dumped/stacked on open spaces wherever feasible and much of these stock gets damaged because of seepage of water from the ground in the absence of proper plinth or height of ground or due to floods and rains.

#### **5.4.2 Poor condition of storage facilities**

Utter disregard to safe and scientific storage practices have resulted in excessive damages to food grains in the central pool maintained by SGAs in Punjab and Haryana. In addition, failure to ensure early disposal of damaged stock led to blockage of storage space. The loss due to damaged stock in the Punjab and Haryana region amounted to 21.168 Cr INR and 13.09 Cr INR respectively<sup>18</sup>.

#### **5.4.3 Storage of old crops leading to damage of food grains**

As per the extant policy of issue of food grains of FCI, the principle of First-In-First-Out (FIFO) should be strictly followed with respect to the crop year as well as within crop year during which the stocks are accepted. The CAG report of 2013 brought out the non-adherence of this principle as a total of 125.99 LMT of food grains (including paddy) pertaining to crop years 2008-09 to 2011-11 was lying in the central pool as on 31 March 2012.

#### **5.4.4 Efficient capacity utilization**

For optimum capacity utilization of the existing capacity, timely and proper planning of movement and distribution of food grains across pan India is a pre-requisite. Despite storage constraints in FCI, the utilization of existing storage capacity in various states/UTs was less than 75% in majority of the months during the period 2006-07 to 2011-12<sup>19</sup>. However, the capacity utilization may not be optimal due to reasons of sudden unanticipated increase in offtake for a particular region or due to unanticipated decrease in procurement.

#### **5.5.5 Non-utilization of available storage capacity for surplus stock of wheat**

With proper planning of timely move of stock from the major procuring states to the consuming states, it is possible to make storage space available for the ensuing procurements and save on the carry over charges that FCI is required to pay to the SGAs beyond the prescribed time period. However, based on the CAG report of 2013, the aggregate wheat stock available with the SGAs of Punjab and Haryana at the end of each procurement season during 2006-07 to 2011-12 was 609.83 LMT, against which the aggregate vacant storage space available in the major wheat consuming states was 164.82 LMT.

In a gross misappropriation of silo storage facility available with FCI, out of a total of 4.62 LMT available with it, 3.52 LMT was lying unused for a period ranging from eight to 30 years<sup>20</sup>.

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15ibid

16ibid

17Information provided by Mr KN Mohanan, Head- Audit and Surveillance, Edelweiss integrated Commodity Management Ltd, Mumbai

18Performance audit report on storage management and movement of food grains in FCI – CAG report 2013

19ibid

20ibid

## **VI. Conclusions and Recommendations**

From the foregoing facts and figures, it is concluded that unless some very drastic measures are taken to improve the storage capacity of food grains, the wastage of food grains cannot be curbed which otherwise could be utilized for feeding millions of poor people. From augmenting the existing storage capacity by construction of new ones through various means both public and private including partnerships, the need of the hour is to revamp the existing storage management of food grains in the country and make people and agencies accountable and responsible for their jobs of ensuring food security. Integration of the entire storage business in India through MIS would go a long way in ensuring timely decisions are taken for optimum utilization of the existing facilities. Some of the recommendations, not in any particular order, for ensuring that the storage losses are minimized are discussed as under:

- ✓ With proper foresight and planning in lifting the stock of the central pool in time from SGAs, money paid as hiring charges and carry over charges to SGAs can be utilized for construction of new storage spaces
- ✓ Adequate manpower and supervision is required for scientific and safe storage in CAP storage.
- ✓ To save costs, proper plinths should be constructed in vacant government lands which can be used for temporary storage of food grains during peak procurement seasons.
- ✓ Hiring charges of FCI would continue to shoot up substantially in future unless owned storage capacity is augmented proportionately as against creation of storage capacity for guaranteed hiring by FCI
- ✓ Poor and reckless management and cumbersome paperwork leading to non-availability of storage space even if the space is held by damaged stock for want of disposal approvals from FCI should be dealt with appropriately by decentralized decision making.
- ✓ Non adherence of safe and scientific storage methods should be dealt with an iron hand and the strictest of punishment is to be enforced and accountability fixed.
- ✓ The total number of covered storage required for meeting the deficiency of 35 million MT is 7000 godowns at the rate of 5000 tonnes per godown. At approximately 1,450 INR<sup>21</sup> per tonne requirement of funds for the godowns, the total funds requirement at current rates for constructing 7000 numbers of covered storage is 5,075 Cr INR excluding the cost of land.
- ✓ Alternative route like Private Entrepreneurial Guarantee (PEG) scheme to be encouraged vigorously.
- ✓ Need of the hour is to create a central data base with daily updates from all warehouses as to the availability of covered, CAP storages and silos to better manage the stocks with adequate responsibility and accountability accorded with adequate and competent manpower with high level supervision and quick decision making freedom and delegation of powers given to the nodal heads.
- ✓ Timely and systematic evacuation planning can lead to utilization of vacant storage space and minimize payment of carry over charges to SGAs which can come in handy for construction of covered storage
- ✓ Adequate planning well in advance for requisitioning of railway rakes can lead to minimization of losses and increase the economic and efficient utilization of available storage spaces.
- ✓ Proper integration of all regions with an efficient and robust MIS manned by efficient and competent professionals will definitely bring about the much needed change in the storage sector.
- ✓ Intervention of state governments in identifying and handing over land for construction of covered storage spaces without undue delay in obtaining of various clearances will speed up addition of storage capacity.
- ✓ FCI is yet to implement the transportation of food grains from farm to silos by specially designed trucks which was an important element of modernization and up gradation of bulk grain handling infrastructure

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