

WAREHOUSE MANAGEMENT IN INDIA : AN OVERVIEW

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ABSTRACT

Warehouses are the scientific storage structures constructed especially for the protection of quantity and quality of stored products. Warehouses, famously known as reservoir of our national wealth, play a vital role in promoting agriculture marketing, rural banking, financing and ensuring food security in the country. The warehousing capacity available in India, in public, cooperative and private sector is about 117.52 million MTs and as per government's estimate additional 35 million MTs warehousing capacity is still required for the storage of all major crops. Considering the significance of the proper storage of agriculture produce and other products the present paper attempts to examine the present status of warehousing sector in India. Specifically the paper discussed the various types of warehouses available in India and the main warehousing agencies operating here. In addition, the paper also compared the Indian warehouses with those of developed nations. In the last some recommendations for the Indian warehousing sector are presented. The paper is based on the secondary sources of data which have been collected from various annual reports of CWC, FCI, Warehousing Development and Regulatory Authority (WDRA), Department of Food and Public Distribution, and various issues of Economic surveys etc.

Key Words: Warehouses, Capacity, Food grains.**1. Introduction**

Warehouses are the scientific storage structures constructed especially for the protection of quantity and quality of stored products. They are meant for carrying surplus production for future consumption. A warehouse is a crucial link between production of food grains and its distribution and helps in preserving agricultural crops from hazards of drought, flood, wind, cold and heat or rain from the time they are produced until they are needed by the consumer (Kumar,2014). In fact, warehouses are considered as the backbone for developing agro processing industry as they play a very crucial role in strengthening agricultural supply chain, ensuring food security and price stabilization (Rawat, 2014). That's why they are called as reservoir of our national wealth.

Warehousing plays a vital role in promoting agriculture marketing, rural banking and financing and ensuring food security in the country. It enables the markets to ease the pressure during harvest season and maintain uninterrupted supply of agricultural commodities during off season. Thus, it

solves the problems of glut and scarcity, which are the usual problems in agricultural marketing. Though warehousing is an independent economic activity, yet it is closely linked with production, consumption and trade. The need for storing the goods arises due to the seasonal production, seasonal demand, production in anticipation of demand, equalizes demand and supply, stabilization of prices, storage of raw material for continuity of productive activity, to remove regional imbalances and for curing and processing (Acharya and Aggarwal, 2004).

Conventionally, warehouses in India were mainly used for the storage of raw materials, work-in-process inventory or finished goods in a covered space and most of the warehouses have no optimal or proper size or space, ventilation and lighting facility, racking system, poor working conditions and lack in proper inventory management or technology solutions such as Warehouse Management Systems (WMS) (Recto, 1980). The main drawback of traditional warehouses was that they provide storage for a specific or shorter period only. But with the growth of logistics and supply chain management activities, impact of globalization, increase in FDI in various sectors like retail, pharma, manufacturing, automobile, cold storage etc., warehousing sector has become one of the vital component of the supply chain (ILWR, 2014).

2. The Present Study

2.1 Purpose of Study

Considering the significance of the proper storage of agriculture produce, industrial products etc. the present paper attempts to examine the present status of warehousing sector in India. Specifically the paper discussed the various types of warehouses available in India and the main warehousing agencies operating here. In addition, the paper also compared the Indian warehouses with those of developed nations. In the last some recommendations for the Indian warehousing sector are presented.

2.2 Methodology

The paper is based on the secondary sources of data. Data has been collected from the various annual reports of Central Warehousing Corporation (CWC), Department of Food and Public Distribution, Food Corporation of India (FCI), Warehousing Development and Regulatory Authority (WDRA) and various issues of Economic surveys, government of India etc.

3. Literature Review

Mishra et al. (2003) conducted a multi-dimensional analysis on the performance of Andhra Pradesh State Warehousing Corporation (APSWC). Functioning of APSWC was compared with selected State Level Public Enterprises (SLPEs) in Andhra Pradesh. The study found that APSWC is performing well on the financial as well as on the non financial indicators as compared to other SLPEs. Five state warehousing corporations were selected to benchmark the performance of APSWC and Uttar Pradesh State Warehousing Corporation (UPSWC) was found as a benchmark of performance of APSWC.

Machackova (2009) evaluated the warehouses

investment in Central Europe and found that contract warehousing was more attractive; although the private warehousing was economically feasible. Nath (2012) analyzed the economic performance of Maharashtra State Warehousing Corporation (MSWC). The study found that net profit before tax of MSWC increased continuously from 1754 lakh to 3526 lakh (50.24% increases) during the 2005–2010. All economic performance indicators and financial ratios showed a significant economic performance and positive signs of agri-warehousing in Maharashtra. The author suggested that training and awareness programs should be conducted for farmers, warehouse managers and supporting staff. Similarly, Mahajan et al. (2013) recommended that Indian logistics companies to modernize and optimize their warehouses in order to take a stand in the global market.

Kaur and Kaur (2013) analyzed the performance of Punjab State Warehousing Corporation (PSWC) and found that some storage capacity remained vacant throughout their study period which was not utilized by depositors. Authors suggested that in order to utilize the vacant storage capacity of warehouses, PSWC should also store the other notified commodities like cement, steel, cotton textiles, leather, rubber, rubber products, fertilizers etc. along with the food grains. Borkar et al. (2014) examined the present status of warehouses and warehousing system in Allahabad. The study revealed that the capacity of warehouses was sufficient to satisfy the demand of population but there was a lack of modern facilities for enhancing the quality and quantity of food grains. Further, the study found that the storage capacity of warehouses in Allahabad was 2,40,919MTs while the wastage was 23,312MTs (11.80%) and the warehouses owned by FCI were found to be superior to non FCI warehouses. The authors suggested the need to adopt and implement the modern facilities and techniques for the modernization of warehousing system, proper precautionary measures, hygienic and cleanliness improvement for the betterment of warehouses in Allahabad.

Kumar (2014) stated that the major cause for wastage or rotting of food grains in India is that warehouses were not fully utilizing their available capacity. The author suggested that there was a need to build new warehouses that would properly as well as fully utilize the available capacity of warehouses for achieving food security because proper storage and maintenance of the produced grain is equally important as producing enough foodgrains.

Sharon et al. (2014) stated that in India grain storage capacity is not enough to meet the storage requirement for buffer and operational stocks, public distribution system and farm level storage. The authors suggested that storage facilities of India should adopt scientific storage, drying equipments, implement Integrated Pest Management (IPM) system, ensure proper aeration of grains and regular inspection of grain stock.

Chaturvedi et al. (2015) recommended for the construction of new storage capacity through public and private partnerships (PPP), revamping the existing storage management of food grains in the country so that wasted food grains could be utilized for feeding millions of poor people and

ensure food security. Dhande et al. (2015) examined the existing policies and practices of grain warehousing in Akola,

Today, it is operating 464 warehouses across the country with a storage capacity of 114.94 lakh MTs (CWC Annual Report, 2014-15). It provides warehousing services for a wide range of products ranging from agricultural produce to sophisticated industrial products. Its main functions are to acquire and build godowns and warehouses at suitable places in India or abroad, to run warehouses for the storage of agricultural produce, seeds, fertilizers, agricultural implements etc., to arrange facilities for transport of agricultural produce, to act as an agent of the government for the purposes of purchase, sale, storage and distribution of agricultural produce etc. Apart from this, CWC also offers services in the area of clearing and forwarding, handling and transportation, disinfestation services, fumigation services and other ancillary activities. In addition, it also offers consultancy services/training for the construction of warehousing infrastructure to different agencies (Adigal and Singh, 2015)

Table 1 : Storage Capacity and Utilization of CWC**(In lakh MTs)**

Year	Owned/ Covered Capacity	Hired and Management Capacity	Plinth Capacity	Total Capacity	Utilization %	No. of Warehouses
2008-09	67.60	23.15	14.50	105.25	82	499
2009-10	68.46	21.32	16.20	105.98	85	487
2010-11	69.85	17.81	14.81	102.47	88	479
2011-12	71.81	14.86	14.18	100.85	91	468
2012-13	73.95	20.14	13.93	108.02	97.90	469
2013- 14	75.81	14.92	14.25	104.94	83.71	471
2014-15	75.78	25.60	13.56	114.94	96.39	464

Source: Compiled from various Annual Reports of CWC (2008-09 to 2014-15), Retrieved from <http://cewacor.nic.in/index.php#>

Data in table 1 shows that the storage capacity as well as the capacity utilization of CWC has increased over the years but the number of warehouses has reduced from 499 in 2008-09 to 464 in 2014-15. This is mainly due to the reconstruction or repair problems, damaged of warehouses due to natural calamities or due to non-usage of few warehouses. The average capacity utilization has also declined during the year 2013-14. It was mainly due to low stock position of FCI in view of deficit in wheat procurement as well as liquidation of stocks for PDS and export (CWC Annual Report, 2014-15).

(b) State Warehousing Corporations (SWCs) : The Central government established state owned and controlled warehousing corporations in various states to enable better storage of agricultural commodities in the 1950s. For instance, Andhra Pradesh State Warehousing Corporation, Haryana State Warehousing Corporation, etc. The first state warehouse was set up in Bihar in 1956. The area of operation of the SWCs is controlled by every district of the state. The total share capital of the SWC is contributed equally by the concerned State government and the CWC. Thus, the SWCs are under the dual control of the State government and the CWC. The CWC has 17 State Warehousing Corporations (SWCs) operating in various states of India. The total investment of the CWC,

which is 50% shareholder in the equity capital of the SWCs, as on 31.03.2015 was `61.79 crore and the SWCs operated 1699 warehouses with a total capacity of 270.95 lakh MTs (Department of Food and Public Distribution Annual Report, 2014-15).

The SWCs were set up with the aim to provide a negotiable instrument by way of warehouse receipt to farmers for securing credit from the banks, promote and develop scientific storage facilities in order to minimize wastage and losses in storage, help farmers to store their stocks for better realization by avoiding distress sale and simultaneously availing credit, and to assist orderly marketing and price support/control measures of the government. The main functions of every SWC is to construct and manage warehouses in the state for the storage of agricultural produce etc., support PDS in the state, act as an agent of the CWC or the government for the purpose of purchase, sale, storage and distribution of agricultural produce etc. Table 2 shows that total capacity of SWCs has increased from 187.32 lakh MTs in 2007-08 to 270.95 lakh MTs in 2014-15 and the number of warehouses increased from 1576 in the year 2007-08 to 1699 in 2014-15. Further, data shows that SWC also started creating management capacity from the year 2011-12 onwards.

Table 2 : Total Capacity of SWC**(In lakh MTs)**

Year	Owned/Covered Capacity	Hired and Management Capacity	Plinth Capacity	Total Capacity	Utilization %	No. of Warehouses
2007-08	121.41	63.05	0	02.86	187.32	1576
2008-09	122.63	70.52	0	03.67	196.82	1595

2009-10	123.97	77.09	0	8.20	209.26	1595
2010-11	126.34	74.89	0	7.04	211.27	1585
2011-12	131.13	57.54	31.98	13.96	234.61	1631
2012-13	137.14	59.18	41.35	13.26	250.93	1659
2013-14	148.33	65.22	43.80	9.61	266.96	1689
2014-15	156.34	52.67	54.27	07.67	270.95	1699

Source: Compiled from various Annual Reports of CWC (2007-08 to 2014-15), Retrieved from <http://cewacor.nic.in/index.php#>

(c) Food Corporation of India (FCI)

Established in 1965 it acts as a nodal agency of the government of India which is responsible for executing food policies of the Central government. The first district office of FCI was set up in Tamil Nadu. The idea behind setting up FCI was the efficient management of the food grains of our country with a view to ensure their equitable distribution at affordable prices to the vulnerable sections of society. Its main functions are procurement at Minimum Support Price (MSP) from farmers, storage, movement, transportation, distribution and sale of food grains on behalf of the Central government. Besides, it is also engaged in handling, storage and distribution

of sugar in North Eastern State and Jammu & Kashmir. In this way, FCI fulfills the main objectives of (i) providing price support operations through procurement for safeguarding the interests of the farmers; (ii) making food grains available and accessible at reasonable price to weaker and vulnerable sections of society through Targeted Public Distribution System (TPDS) and other government schemes through efficient and cost effective movement, and (iii) maintaining satisfactory level of operational and buffer stocks of food grains to ensure national food security and to carry out price stabilisation operations (FCI Annual Report, 2013-14).

Table 3 : Storage Capacity with FCI

(in million tonnes)

Year	2006	2007	2008	2009	2010	2011	2012	2013
Covered/Owned	12.93	12.95	12.97	12.97	12.99	13.00	13.00	13.00
Hired	09.90	8.71	8.71	12.89	15.46	17.21	20.99	20.86
Total	22.83	21.66	23.09	25.86	28.45	30.21	33.99	33.86
Cover and Plinth (CAP)	2.21	2.20	2.17	2.51	2.62	2.64	2.63	2.65
Hired	0.51	0.03	0.02	0.47	0.54	0.75	1.11	0.38
Total	2.72	2.23	2.19	2.98	2.62	2.64	2.63	2.65
Grand Total	25.55	25.55	23.89	25.28	31.07	32.85	36.62	36.51

Source: Compiled from various Annual Reports of FCI (2006-2013), Retrieved from <http://www.fci.gov.in/>

Data in table 3 shows that FCI's covered/owned capacity has increased from 12.93 million tonnes in 2006 to 13.00 million tonnes in 2013 and total covered/owned capacity has increased to 33.86 million tonnes in 2013 from

22.83 million tonnes in 2006. Whereas, the CAP hired capacity of FCI decreased from 0.51 million tonnes in 2006 to 0.39 million tonnes in 2013.

Table 4 : Zone- wise Storage Capacity with FCI

(in lac tonnes)

Zone	FCI owned capacity	Covered capacity	Hired capacity	CAP capacity*	Gross total**	Stock utilization	Total effective storage capacity as per region	Utilization of effective capacity***
East Zone	15.95	24.21	8.26	1.56	34.03	63	21.41	76
North-East Zone	4.05	5.48	1.43	0.00	6.91	65	5.32	67
North Zone	57.17	223.09	165.92	18.42	407.43	64	235.17	65
South Zone	28.07	46.75	18.68	4.50	69.93	75	48.88	79
West Zone	22.49	37.98	15.49	1.66	55.13	63	38.22	65

Source: Compiled from Retrieved from <http://fci.gov.in/app/webroot/upload/Storage/Stg.Cap.30.11.2015.pdf>

Note : * : This includes owned and hired capacity. ** : This includes the covered, hired and CAP capacity.

*** : Capacity available with FCI for storage of food grains, as reported by the Regions.

Table 4 shows zone wise storage capacity of FCI. Data revealed that FCI's owned capacity is highest in north zone because of the presence of agrarian states like Punjab, Haryana, Uttar Pradesh etc. and lowest in north-east zone. Further, highest total effective capacity has been created in north zone, i.e., 235.17 lac tonnes and lowest capacity has been created by north-east zone. The reasons behind the lowest

capacity created by north east zone is the topographical and natural calamities issues like sudden landslide, cloud burst, and monsoon etc. in this region. Due to these constraints north east regions are not capable of maintaining adequate level of food grain stocks (Department of Food and Public Distribution Annual Report, 2014-15).

Table 5 : Status of Warehousing Capacity in India

(in million MTs)

S. No.	Name of the organization / sector	Storage capacity
1.	Food Corporation of India (FCI)	38.34
2.	Central Warehousing Corporation (CWC)	10.30
3.	State Warehousing Corporation (SWC) and State Civil Supplies	34.84
4.	Cooperative Sector	15.07
5.	Private Sector	18.97
	Total	117.52

Source: Department of Food and Public Distribution (2015), Retrieved from <http://wdra.nic.in/FinalBook.pdf>

Table 5 shows the present status of warehousing capacity available in public, cooperative and private sector warehouses in India. Data in above table shows that in case of public sector, FCI has the highest 38.34 million MTs capacity whereas CWC has 10.30 million MTs and SWC has 34.84 million MTs capacity. On the other hand, the cooperative sector has 15.07 million MTs capacity and the private sector has 18.97 million MTs capacity. The total capacity of warehouses in India is 117.52 million MTs and out of which most of the warehousing capacity is handled by three public warehousing agencies i.e., FCI, CWC and SWC (83.48 million MTs) (Department of Food and Public Distribution, 2015).

6. Warehouses in Developed Countries : A Lesson for India

In comparison to the developed nations like US and European countries, warehousing sector is less developed in developing countries like India. A number of researchers reported various reasons for less development of warehousing sector in developing countries. For instance, Ray (2007) revealed that in most of the developing countries food is not properly stored and usually become unfit for consumption due to the presence of rodents, insects and fungi etc. Similarly, Okoruwa et al. (2009) found that due to the lack of post harvest facilities or appropriate storage technology for long time Nigeria agriculture has resulted in considerable waste of agricultural output and loss to the economy.

As far as Indian warehouses are concerned following points highlights the key differences between Indian warehouses with that of developed nations.

Firstly, in developed nations warehousing sector is mostly dominated by organized players, in contrast, in India it is mostly dominated by public sector undertakings viz., Central Warehousing Corporation (CWC), State Warehousing Corporations (SWC) and Food Corporation of India (FCI). Meeting the storage requirements of large quantity of food grains for a considerable period of time is a challenge for these warehousing corporations.

Secondly, the logistics cost in India is quite high, it is

around 13 to 14 per cent of its GDP against 7 to 8 per cent of developed countries. This is due to various market constraints like highly fragmented structures, poor infrastructure and complicated tax structure. Thirdly, Indian warehouses have traditionally been basic godown facilities with poor infrastructure but warehouses in developed countries have excellent infrastructure, well equipped modern equipments for various activities like material handling, loading/unloading, etc. Whereas in India most of the warehouses still use manual material handling system and are quite smaller in size when compared to warehouses in the foreign countries. In foreign countries warehouses have been operated on economies of scale and use sophisticated material handling equipments, storage scheme and latest IT and communication technologies.

Fourthly, while India's warehousing industry has access to abundant labour with poor training, warehousing staff in developed countries are highly skilled with requisite training for carrying out warehousing operations. Fifthly, warehouses in the USA are very efficient and advanced in comparison to India because they have fully automated technology, Warehouse Management Systems (WMS) and have automatic data collection tools such as Radio Frequency Identification (RFID), barcode and scanner etc. Even the warehousing sector in China has improved considerably over the last decade due to the usage of IT techniques like WMS, emergence of multi-modal logistics hubs (MMLH), integrated logistics park and Free Trade Warehousing Zones (FTWZ) (ILWR, 2014). Lastly, although India's warehousing requirement is expected to grow at an annual average rate of 9 percent to 1,439 million sq. ft in 2019 from 919 million sq. ft in 2014 (Sanjai and Kamik, 2014) but still they are used as the mode of storage of goods only. They are not used as a strategic area for developing a competitive advantage as used in developed countries like USA, Europe etc (Sophe, 2009).

7. Recommendations and Conclusions

In the light of above discussion following measures can be adopted by different stakeholders for the progress of warehousing sector in India.

1. Need to generate additional capacity of warehouses :

At present India does not have the adequate storage facilities resulting in avoidable wastages. Moreover the tremendous growth in industry over the past few decades has further put pressure on the existing facilities (WDR Annual Report, 2014-15). Thus, it is essential to address two issues, firstly, to build additional storage capacity and secondly, to upgrade the existing state owned warehouses because most of the warehouses owned by state agencies are over 15-20 years old.

2. Need to focus on other commodities : The warehouses of government agencies are mainly occupied by wheat and rice which leads to acute shortage for storage space for other food grains and agri commodities. Due to rising production of other commodities like oilseeds, sugarcane, cotton, pulses, cereals etc., there is a need to create adequate warehousing space for such commodities also.

3. Need to initiate warehouse performance indicator : Keeping in view of possible situations like pest attacks, fungi growth etc. there is a need to introduce performance indicators in warehouses which should check the efficiency of the warehouses including quality parameters like ability to control wastage, pest control measures, provide wide range of testing, grading and certification services (Abhay,2011).

4. Need to issue more Negotiable Warehouse Receipt (NWR) : By depositing their produce in a registered warehouse and obtaining NWR, farmers can use it as collateral for obtaining short-term borrowing for their working capital requirement for the current sowing season from banks. This kind of system would act as an incentive for farmers to produce quality products and with specification amenable to standardization and storage in registered warehouses. Thus the introduction of NWR system would not only help farmers to avail better credit facilities and avoid distress sale but would also safeguard financial institutions by mitigating risks inherent in credit extension to farmers (NIPFP,2015).

5. Encouraging cooperatives : The government should take initiative by educating the farmer community to form cooperatives and organize into larger bodies which would construct storage capacity and various production pockets in the nearby/regional areas.

6. Requirement of skilled manpower in warehousing sector : Despite the fact that the population of India is 1.277 billion plus, still there is a shortage of skilled manpower in warehousing sector. The main reasons for this situation are unorganized and fragmented structure of this sector, entry of new international retailers and many global players, poor working conditions, less attractive incentives and benefits and the emergence of attractive alternate career options. In this scenario, the logistics companies, educational institutions and the government should work collaboratively and create job awareness, among masses, about this sector. Specifically efforts should be directed towards promoting training through short-term courses and support trainees with suitable placements.

7. Need for more training institutes : Lack of government recognized training institutes results in the shortage of trained manpower in this sector that can cater the needs of mid-level

managers in the Indian warehousing industry. In India, there are very few formal training institutes and practically none for operational training in associated areas. Although, warehousing is an important part of supply chain and logistics industry and it is being driven by an increase in production and organized retail yet there is a lack of training institutes which can sharpen the managerial skills of people. Thus, there is a need to build recognized training institutes for warehouse employees that will help in maintaining the quality and quantity of the goods stored (Cargo Talk Debate, 2014). Training institutes are required to impart training to prospective employees regarding how to handle sophisticated material handling equipments, warehouse management systems and helps them in understanding the sensitivity of products stored as well as its storage requirement, overcoming stock visibility issues, stock traceability, lower pilferages and how to reduce the number of accidents occurring in the warehouse.

8. Need to adopt drying system : Usually, there are no proper guidelines available for optimum drying of grains for crops. As a result, most of the crops that are produced are usually over dried and results in loss of quality and quantity. Food grains are required to be properly dried up before storage. For this bulk dryer, mathematical models need to be developed (Jayas and White, 2003). Ojha (1985) suggested that by setting up a community drying-cum-storage facility will help in enhancing India's ability to meet its food security objectives, reduce losses, and increase the efficiency of purchasing and distributing grains.

9. Maintenance of proper moisture and temperature : These two basic requirements are identified as main reasons behind spoilage of stored grains. Higher moisture content increases the risk of degrading postharvest quality and thus the grains needs to be stored carefully. In moist and warm grains, insects, mites and fungi can increase rapidly and produce moisture, heat and carbon dioxide by respiration, which can further deteriorate the grain bulk (White and Sinha, 1980). The stored grains maintained at a sufficiently low moisture level can be stored for many years without any significant loss in quality.

10. Framing up safe storage guidelines : As such there are no proper guidelines for the safe storage of foodgrains. Safe storage of grain refers to the time period during which the grain can be stored safely without any significant loss in its quality and quantity. This period varies with respect to grain moisture content and temperature. There is a need to develop guidelines for all the common grains at all possible moisture contents and temperatures in order to provide information to farmers on the number of days available for completion of post-harvest operations before grain deterioration occurs (Karunakaran, et al, 2001).

11. Need to strengthen traditional means of storage : The traditional means of storage are required to be strengthened along with modern storage system like silos plant. The traditional storage structures are not suitable for storing grains for very long periods. Due to improper storage structures for food grains around `50,000 crores every year are lost (Singh, 2010). Therefore the traditional means of storage must be

upgraded to prevent enormous storage losses. These efforts will enhance safe and economical means of grain storage for long durations.

12. Need to implement good pest control techniques : Pest control measures are not followed properly and systematically in Indian warehouses. As a result, during storage, quantitative as well as qualitative losses occur due to insects, rodents, and micro-organisms. Due to non availability of pest control techniques approximately 12 to 16 million metric tons of food grains is wasted each year that could feed one-third of India's poor population (FAO, 2011). A large number of insects/pests attack the stored grains. For controlling rodents rat cages, poison baits and use of fumigation should be adopted.

13. Strictly enforce maintenance standards : The operation and maintenance of the storage facility need to be governed by strict norms with a view to ensure provision of quality service. Any violations of these standards should attract stiff penalties.

14. Remove the constraints in setting up of warehouses : This can be done by providing all financial and other benefits at cheaper rates, lowering the cost of the land in urban, semi urban and rural areas for warehouses construction, provide attractive storage handling charges and by providing modern technology with trained staff (WDRA Report, 2011).

15. Enhance the role of Warehousing Development and Regulatory Authority (WDRA): Instead of playing just the role of being a regulatory body which only register warehouses and issue negotiable warehouse receipt, WDRA should play a proactive role in developing an orderly, robust and reliable warehousing system in the country, not only for food grains and other dry commodities but also for perishable commodities like fruits and vegetables. For the storage of perishable agricultural commodities, warehouses with controlled conditions of temperature and humidity would have to be created. The authority should encourage testing and grading of such commodities, reserve storage space in warehouses particularly in rural areas for agricultural commodities, develop efficiency and expertise among the warehousemen, intensive training programmes for the officials of warehouses etc. (GOI, 2011).

16. Reduce usage of CAP storage : Every year the government agencies buys food grains from the farmers but does not have enough space to safely store it. FCI has insufficient number of grain silos and covered godowns with adequate storage capacities. As a result the grains are stored in outdoors under CAP storage (Cover and Plinth) across the country. Due to this most of the grains are prone to rodents, moisture, birds and pests. Every year tonnes of food grains go wasted due to these sorts of arrangements. So there is a need to reduce the dependence on CAP storage. Even in case of unavoidable situations, the storage of food grains in the CAP should not be more than a year with at least one turnover of the stock after every 3 to 6 months to retain the quality of the food grains. But unfortunately a lot of stock is lying in the open where even the plinths are not available. Thus the food logistic chain in India needs huge investment in providing proper storage facilities (Kumar, 2015).

17. Follow principle of FIFO : There is a need to practically implement the principle of First-In-First-Out (FIFO) in the warehousing sector. FIFO should be strictly followed with respect to the crop year as well as within crop year during which the stocks are accepted.

18. Stock rotation : Similarly, stock rotation method should also be followed by warehousing agencies. As the primary motive for stock rotation is that a warehouse positions older items so that they sell more quickly than newer inventory. Rotating stocks reduces the potential for throwing out inventory that have pending expiration dates.

19. 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. As per CAG Report (2013), the utilization of existing storage capacity of FCI in various states/UTs was less than 75% in majority of the months during the period 2006-07 to 2011-2012. The capacity utilization may not be optimal due to reasons like sudden, unanticipated increase for a particular region or due to unanticipated decrease in procurement.

20. Other recommendations : This includes separation of different commodities for the better and easy handling; construction of proper plinths in the vacant government lands for temporary storage of food grains during peak procurement seasons; restructuring and reorganizing warehousing administration including decentralized decision making; creating a central database 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 and delegation of powers given to the nodal heads; timely and systematic evacuation planning and lastly, adopt proper safety measures like keeping the godowns neat and clean, regular inspection of warehouse, use appropriate fire extinguishers and do not store hazardous and non-hazardous goods together.

To conclude, the paper discussed the present status of warehousing sector in India. Data revealed that Central Warehousing Corporation is performing well and created additional capacity over the years. As far as State Warehousing Corporations are concerned, they have created 1699 warehouses till 2014-15 and their total capacity has increased to 270.95 lakh MTs. In case of FCI, the study found that agency keeps on hiring more space from outside as its own capacity is low. Moreover, FCI has more CAP facility and it hired space from state warehousing agencies every year. In this regard the study recommended few measures such as generate additional storage capacity, renovate existing warehouses and implement a robust Negotiable Warehouse Receipt (NWR) system to make available more funds to farm producers and simultaneously provide security to the lenders (Rawat, 2014). Further apart from the major agricultural produce, sufficient provision should be made for the proper storage of other commodities like oilseeds, sugarcane, cotton and industrial goods. Other measures that can uplift the warehouses' efficiency includes setting up of warehouse performance indicator, focus on creating skilled manpower,

provision of proper training institutes, more usage of pest control techniques, control moisture and temperature while storage, reduce usage of CAP, focus on efficient inventory management systems etc.

8. References

- Abhay, N. (2011). Agriculture Warehousing in India – Data, Statistics and Opportunities. Retrieved December 13, 2015, from <http://indiamicrofinance.com/agriculture-warehousing-india.html>
- Acharya, S.S., & Aggarwal, N.L. (2004). Agricultural Marketing in India (2nd ed.). New Delhi: Oxford and IBH Publishing: (pp.117-118). Retrieved December 21, 2015, from <https://books.google.co.in/books?id=JNSiChnCangC&q=meaning+of+warehouses#v=snippet&q=meaning%20of%20warehouses&f=false>
- Adigal, V.L & Singh, S.(2015). Agriculture Marketing Vis—Vis Warehousing Facility (Case Study of Central Warehousing Corporation), *The Business & Management Review*, 5(4),43-50.
- Borkar,N., Kumar,A., Nakade,V., & Karande,D. (2014).Evaluation of Warehousing System in Allahabad City. *International Journal of Research in Engineering and Technology*,2(3), 2320-8791.
- CAG Report (2013).Performance Audit Report on Storage Management and Movement of Food grain in Food Corporation of India (FCI). Ministry of Consumer Affairs, Food and Public Distribution, New Delhi, Retrieved December 25, 2015, from <http://saiindia.gov.in/content/report-no-7-2013-report-cag-india-social-general-economic-non-psus-sectors-ended-31-march>
- Cargo Talk Debate (2014).Cargo Talk. *South Asia's Leading Monthly Cargo*, XV(1),1-40, Retrieved December 25, 2015, from <http://www.cargotalk.in/pdfs/Cargo%20Dec%2014.pdf>
- Chaturvedi, B.K., Colnel, L., & Raj, A.T.A. (2015). Agricultural Storage Infrastructure in India: An Overview. *Journal of Business and Manangement*,17(5),37-73.
- Chavan, S.K. (2010). Types of Warehouses. Retrieved December 25, 2015, from <http://www.managementparadise.com/forums/elements-logistics-logs/200348-types-warehouses.html>
- CWC Annual Report (2014-15). Central Warehousing Corporation Annual Report. Government of India: New Delhi. (p.198). Retrieved June 30, 2015, from http://www.cewacor.nic.in/Docs/ar_cwc_2014_15_011215.pdf
- Department of Food and Public Distribution (2014-15). Annual Report. Retrieved June 30, 2015, from <http://dfpd.nic.in/writereaddata/images/pdf/ann-2014-15.pdf>
- Department of Food and Public Distribution (2015).Report of the Committee for Strengthening Negotiable Warehouse Receipts by the Warehousing Development and Regulatory Authority in the Country. Government of India. New Delhi, (p. 13). Retrieved January 15, 2016, from <http://wdra.nic.in/FinalBook.pdf>
- Dhande,V., Masih, D., & Sonkar,C. (2015).Study on Policies and Practices of Grain Warehousing System in Akola District Maharashtra. *International Journal of Science, Engineering and Technology*,3(5),1312-1315.
- FAO (2011). Food and Agriculture Organization Report on Global Food Losses and Food Waste – Extent, Causes and Prevention: Rome Retrieved January 20, 2016, from <http://www.fao.org/docrep/014/mb060e/mb060e.pdf>
- FCI Annual Report (2013-14).Food Corporation of India Annual Report. Government of India. New Delhi. Retrieved December 24, 2015, from http://fci.gov.in/app/webroot/upload/finance/final_annual_report13-14.pdf
- GOI (2011). Report of Working Group on Warehousing Development and Regulation for the Twelfth Plan Period (2012-17). Planning Commission. Government of India. New Delhi.(p. 13). Retrieved January 18, 2016, from http://planningcommission.gov.in/aboutus/committee/wrkgrp12/pp/wg_ware.pdf
- ICCIR (2013).Indian Cold Chain Industry Report: Modernization of the Cold Storage Infrastructure. Onicra Credit Rating Agency of India Limited, India. (p.4). Retrieved December 17, 2015, from <http://www.onicra.com/images/pdf/publications/coldchainindustryreportjune2014.pdf>
- ILWR (2014).Indian Logistics and Warehousing Report. Knight Frank. India. (pp. 9-15). Retrieved December 18, 2015, from <http://content.knightfrank.com/research/677/documents/en/india-warehousing-and-logistics-report-2326.pdf>
- Jayas, D.S. & White, N.D.G. (2003).Storage and Drying of Grain in Canada: Low Cost Approaches. *Food Control*,14(4),255-261.
- Karunakaran,C., Muir, W.E., Jayas, D.S.,White, N.D.G., & Abramson, D. (2001).Safe Storage Time of High Moisture Wheat. *Journal of Stored Product Research*, 37(3), 303-312.
- Kaur, R., and Kaur, R. (2013). Operational Performance of Punjab State Warehousing Corporation. *Radix International Journal of Banking, Finance and Accounting*, 2(10),1-12.
- Kumar, N.S.(2014).A Study of Warehousing Agencies in India. *An International Peer Reviewed Scholarly Research Journal for Interdisciplinary Studies*, II(XIII),1678-1684.
- Kumar, S. (2015).Report of the High Level Committee on Reorienting the Role and Restructuring of Food Corporation of India. New Delhi. (pp.1-143) Retrieved January 15, 2016, from <http://fci.gov.in/app/webroot/upload/News/Report%20o>

f%20the%20High%20Level%20Committee%20on%20Reorienting%20the%20Role%20and%20Restructuring%20of%20FCI_English.pdf

- Kidwai, A.H., & Kuzur, G. (2015). Seaports, Dry Ports, Development Corridors Implications for Regional Development in Globalizing India. *Working Paper no. 178*. Institute for Studies in Industrial Development. New Delhi. (pp.3-4). Retrieved January 15, 2016, from <http://esocialsciences.org/Articles/ShowArticle.aspx?qsbGp0Ut9EHmCw/EpGtd/DaMUpdjlifTJFEh3H9YiGQWo>
- Machackova J. (2009). Economic Evaluation of a Warehouse Investment in Central Europe: Case Study at Nokian Heavy Tyres Ltd. Degree Programme in International Business. *Thesis*, Tampereen Ammattikorkeakoulu University of Applied Sciences, Finland, pp. 1-59. Retrieved December 22, 2015, from <https://www.theseus.fi/bitstream/handle/10024/8484/Machackova.Jana.pdf?sequence=2>
- Mahajan, V., Singh, S.P., & Singh, S.K. (2013). Analysis of Indian Warehousing Sector and Warehouse Optimization and Modernization Techniques. *International Journal on Advanced Computer Theory and Engineering*, 29(5), 2319-2526.
- Mishra, R.K., Navin, B., & Geeta, P. (2003). Performance of Andhra Pradesh State Warehousing Corporation-A Multi Dimensional Analysis. Economic Liberalization and Public Enterprises, New Delhi: Concept Publishing Company, India, pp. 106-118.
- Nath, R. (2012). Performance of Agri- Warehousing in Maharashtra and Market Potential for Negotiable Warehouse Receipts Finance in India. *Indian Journal of Marketing*, 43(12), 5-11, Retrieved December 19, 2015, from <http://indianjournalofmarketing.com/index.php/ijom/article/view/80509>
- Nath (2011). Building Warehousing Competitiveness, Confederation of Indian Industry Institute of Logistics. India p.6, Retrieved July 27, 2015, from https://www.pwc.in/en_IN/in/assets/pdfs/publications-2011/building-warehousing-competitiveness-india.pdf
- NIPFP (2015). National Institute of Public Finance and Policy Report on Warehousing in India. Study Commissioned by the Warehousing Development and Regulatory Authority. New Delhi. (pp.1-75). Retrieved December 28, 2015, from <http://wdra.nic.in/Report.pdf>.
- Ojha, T.P. (1985). Problems and Prospects of Community Type Drying-cum-Storage Complexes in Rural Areas in Storage of Agricultural Durables and Semiperishables. *Central Institute of Agricultural Engineering*. Bhopal, pp. 1-6, Retrieved November 23, 2015, from www.ciae.nic.in/
- Okoruwa, V.O., Ojo, O.A., Akintola, C.M., Ologhobo, A.D., & Ewete, F.K. (2009). Post Harvest Grain Management Storage Techniques and Pesticides Use by Farmers in South-West Nigeria, *Journal of Economics and Development*, 18(1), 53-72.
- Ramaswamy, N., Vilvarayanallur, M., & Kumar. (2014). Human Resource and Skill Requirements in the Transportation, Logistics, Warehousing and Packing Sector (2013-17, 2017-22). (pp.47-48). Retrieved March 16, 2016, from <http://www.nsdindia.org/sites/default/files/files/Transportation-Logistics-Warehousing-and-Packaging.pdf>
- Ramnanth, N. (2012). Why ICDs and CFSs in India Need to Consolidate. Retrieved December 20, 2015, from <http://www.infrastructuretoday.co.in/News.aspx?nid=WPE5ozqstlmpnyAILtrQ>
- Rawat, D. S. (2014). Agri-Infrastructure in India : The Value Chain Perspective”, A Study Jointly Conducted by The Associated Chambers of Commerce and Industry of India (ASSOCHAM) and Yes Bank. Retrieved November 20, 2015, from <http://assocham.org/newsdetail.php?id=4459>
- Ray, S.K. (2007). The India Economy. New Delhi: Prentice Hall of India Private Limited. p.74
- Recto, A.E. (1980). Optimal Location and Sizes of Palay Warehouses in the Philippines. *Journal of Agricultural Economics and Development*, 10(2), 182-200.
- Sanjai, P.R., and Karnik, M. (2014). Indian's Warehousing Requirement to Grow at 9 % in 2019. Knight Frank Report, India. Retrieved December 27, 2015, from <http://www.livemint.com/Industry/tT9jL0yShPccM4gmdkyqK/Indias-warehousing-requirement-to-grow-at-9-in-2019-Knigh.html>
- Sharon, M.E.M., Kavitha, C.V.K., and Alagusundaram K. (2014). Grain Storage Management in India. *Journal of Postharvest Technology*, 02(01), 012-024.
- Singh, P. K. (2010). A Decentralized and Holistic Approach for Grain Management in India. *Current Science*, 99(9), 1179-1180.
- Sophe (2009). Logistic Management (2nd ed.). New Delhi: Pearson Publication, India, p.520.
- WDRA Annual Report (2014-15). Warehousing Development and Regulatory Authority Annual Report. Department of Food and Public Distribution. Government of India, New Delhi. (pp.1-64). Retrieved June 25, 2015, from <http://wdra.nic.in/Annual-report2014-15%20English.pdf>
- WDRA Report (2011). Warehousing Development and Regulatory Authority Report. Department of Food and Public Distribution, Government of India Annual Report. (pp.1-27). Retrieved June 25, 2015, from <http://wdra.nic.in/Annual%20Report%20%28english%29%202013-2014.pdf>
- White, N.D.G. and Sinha, R.N. (1980). Changes in Stored-Wheat Ecosystems Infested with Two Combinations of Insect Species. *Canadian Journal of Zoology*, 58(9), 1524-1534.