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**IMPACT OF WAREHOUSING ON AGRICULTURE SUSTAINABILITY**

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**ABSTRACT**

*Agriculture is the back bone of Indian economy and 54.6% of the Indian population is engaged in agriculture sector. Agriculture Ministry estimates 30% loss in the total agricultural production in India. The post harvesting loss of the country is Rs 92,651 in the year 2016. But country's agriculture marketing process (warehousing) is not sufficient. Farmers do not have proper public or private facilities to retain their entire product or surplus product when there is no good price during harvesting period. Establishment of warehousing for farmers to store their goods will result in reduced post-harvest loss and increase the availability of food in the country. Therefore, warehousing is important in the agriculture marketing and agriculture sector. The main objective of the paper is to study the agriculture production in India and to identify the warehousing capacity and utilization in India. This paper has used the data collected from secondary sources. This paper reveals that if the farmers store their surplus agriculture products in warehouse it will reduce the post harvesting loss, which will automatically increase the farmer's income and also increase food availability of the country therefore warehousing leads to consistent supply of food crops leading to sustainable agriculture. The paper suggests that increase in the number of warehousing facility with proper technology and services will lead to betterment of crop, improvement in agriculture status, leading to agriculture sustainability.*

**KEYWORDS**

warehousing, agriculture sustainability.

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**INTRODUCTION**

Agriculture occupies the most important position in Indian economy. According to sector wise Indian GDP composition in 2017 are as follows: Agriculture (15.4%), Industry (23%) and Services (61.5%). With production of agriculture activity of \$375.61 billion, India is the second largest producer of agriculture product. India accounts for 7.39 percent of total global agricultural output. India is way behind China which has \$991 billion GDP in agriculture sector. GDP of Industrial sector is \$560.97 billion and world rank is 6. In Service sector, India ranks 8th at world level and its GDP is \$1500 billion. Share of primary, secondary and tertiary (services) sectors have been estimated as 18.57 per cent, 27.03 per cent and 54.40 per cent.

This sector also contributes much to sustainable economic development of the country. The sustainable agriculture development of every country depends upon the judicious mix of their available natural resources. The big objective for the improvement of agriculture sector can be realized through rapid growth of agriculture which depends upon increasing Agriculture marketing (warehousing). Thus we can go for the second system which may potentially cause environmental degradation in the economy and affect its sustainability. Therefore, there is a need for tackling the issues related to sustainable agriculture development.

The main aim of any agricultural Programme is to maintain sustainable growth in agricultural production for ensuring food security to the growing population and also to generate adequate surplus for exports. To many, entering a sustainable development path for agriculture and food seems like a daunting challenge. We believe that it is feasible. The overarching motive for this report is to encourage people to act, despite the enormous challenges, or as John F. Kennedy said: "By defining our goal more clearly, by making it seem more manageable and less remote, we can help all people to see it, to draw hope from it, and to move irresistibly toward it."

**DEFINITION OF SUSTAINABLE AGRICULTURE**

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. The concept of sustainability is composed of three pillars: economic, environmental, and social also known informally as profits, planet, and people.

Sustainable agriculture can be defined in many ways, but ultimately it seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture fits into and complements modern agriculture. It rewards the true values of producers and their products. It draws and learns from organic farming. It works on farms and ranches large and small, harnessing new technologies and renewing the best practices of the past.

According to John E. Ikerd "A sustainable agriculture must be economically viable, socially responsible and ecologically sound. The economic, social and ecological issues are interrelated, and all are essential to sustainability. An agriculture that uses up or degrades its natural resource base, or pollutes the natural environment, eventually will lose its ability to produce. It's not sustainable. An agriculture that isn't profitable, at least over time, will not allow its farmers to stay in business. It's not sustainable. An agriculture that fails to meet the needs of society, as producers and citizens as well as consumers, will not be sustained by society. It's not sustainable. A sustainable agriculture must be all three - ecologically sound, economically viable and socially responsible. And the three must be in harmony."

Sustainable agricultural development seeks not only to preserve and maintain natural resources, but also to develop them, as future generations would have much more demand quantity-wise and quality-wise for agricultural and food products. Such goals should ensure a balance with the development of livelihoods enjoyed by the individuals concerned. Livelihood should not be restricted to an indicator of sufficient income levels but should also include public health concerns and education standards.

**IMPORTANCE OF WAREHOUSING IN AGRICULTURE SUSTAINABILITY**

Warehousing is an independent economic activity and is closely linked with production, consumption and trade. Development of agricultural marketing and Agriculture sustainability need strong warehousing system. Warehousing is the important support service for development of agriculture. Increasing volume of commodity trade, especially of agricultural products, has been one of the major sources of growth of merchandise demand and has seen impressive growth after the formation of the World Trade Organization (WTO) and ratification of GATT treaty in 1995. With many developing countries, having predominance of agriculture

in their economy, with their macro growth strategies and with growth of agricultural incomes and employment, a steady increase in agricultural trade volumes is likely in the coming years.

Normally, small farmers do not have the financial strength to retain the produce with them for getting good returns when prices are high. Absence of scientific storage system leads to post harvest loss, wastage and quality deterioration. Heavy loss to the extent of 25% to 30% in fruit and vegetables is observed. Absence of institutional credit mechanism in rural areas and absence of formal mechanism for securitization of commodities leads to either debt trap and exploitation by money lenders or a compulsion to sell immediately after harvesting. A structured warehousing system backed by warehouse receipt financing mechanism is relevant to solve such issues faced by Indian farmers.

country's agriculture marketing process (warehousing) is not sufficient. Farmers do not have proper public or private facilities to retain their entire product or surplus product when there is no good price during harvesting period. Establishment of warehousing for farmers to store their goods will result in reduced post-harvest loss and increase the availability of food in the country. Therefore, warehousing is important in the agriculture marketing and agriculture sector.

### STATEMENT OF PROBLEM

Food security is the major problem in the world. So agricultural sustainability is very important and after reviewing the literature it is found that most of the studies have been done by organic farming in agriculture development. Some of the other studies have been done by agricultural sustainability through the agriculture production and productivity and we use the fertilization for agricultural sustainability but few studies have been done on **Impact of warehousing on agriculture sustainability**. There is hardly any work on **Impact of warehousing on agriculture sustainability** on the possible increase in the food availability in the country by reducing wastage of produced crop and also increase the farmer's income of the country.

### OBJECTIVES OF THE STUDY

1. To study the trends of agriculture production India.
2. To assess the warehouse capacity in India.

### METHODOLOGY OF THE STUDY

This study based on the Secondary data. The secondary data has been collected from comptroller and auditor general of India Report on storage management, FCI, CWCs, and SWCs reports com, Annual Report of Ministry of Consumer Affairs and Public Distribution, Government of India, Assocham-National Summit on Warehousing in India and the Directorate of Agricultural Marketing and Inspection, Government of India. journals, articles, papers and conference volumes.

### SCOPE OF THE STUDY

This paper is based on the Secondary sources of data only. This paper mainly studied on India level only. This study is not focusing on the Private warehouse, co-operative warehouse. This paper not study the programmes related to warehouse.

### REVIEW OF LITERATURE

**Sarah Velten and Julia Leventon et. al (2015)** study in their article "What is Sustainable Agriculture? A Systematic Review" tried to highlight the objective of understanding the concept of sustainable agriculture, especially from a social science and governance point of view and identifying the ideas and aspects that are associated with sustainable agriculture. This study used cluster analysis and the secondary data. The study reveals the strategies to progress by understanding and implementation of sustainable agriculture. Since the beginnings of the debate about sustainable agriculture, there has been a great variety of conceptions of the term.

**V. Basil Hans (2013)** in study on "An Analysis of Sustainable Agricultural Development in India" with the objective of ensuring equity and sustainability declares that agriculture must change to meet the rising demand, to contribute more effectively to the reduction of poverty and malnutrition, and to become ecologically more sustainable. This paper asserts the issues related to sustainable agriculture development.

**Mohammad Sadegh Allahyari (2009)** analyse in his research paper "Agricultural sustainability: Implications for extension systems" the new extension model to achieve sustainable agriculture. This study found that re-thinking in agricultural extension components is mandatory and we must strive to find new functions, strategies and objectives for extension systems toward sustainability.

**Ewa Siemianowska and Andrzej Wesolowski et. al (2017)** in their study "Sustainable agriculture and protection of the environment" observes the farmers' awareness of the principle of sustainable agriculture and balanced fertilization and their influence on the environment. This study used the primary data. The farmers declared that they were aware of the influence of agricultural activities on the environment. The study reveals that declared knowledge on the above-mentioned matter bears no relation to the fertilization practice. There is a need of greater and greater indoctrination of agricultural society of the necessity of putting into practice the principles of sustainable growth, and particularly of balanced fertilization.

**Prakash Shankar Kamble and Dipak Gopinath Chavan (2018)** examined in their study "Sustainability of Indian Agriculture: Challenges and Opportunities" the current situation of Indian agriculture at various dimensions and to identify the existing challenges before India's agriculture sector. The study reveals that current position of Indian agriculture, the major challenge is to secure sustainability of agriculture. Global warming and climate change are having adverse impact on overall agriculture productivity and production in India.

**Waseem Hassan Khan and Aamir Jamal (2018)** in their study on "Sustainable Agricultural Development in India with Special Reference to Jammu and Kashmir: A Macro Analysis" discuss about ensuring equity and sustainability. Agriculture must change to meet the rising demand, to contribute more effectively to the reduction of poverty and malnutrition, and to become ecologically more sustainable. The study used the secondary data. Study concluded that there are various limitations in agricultural sector of Jammu and Kashmir State. It is due to its Geographic's, limited irrigation, and marketing and transportation problem. But, there is a potential for sustainable agricultural development.

**Soumya.K.M (2015)** analysis "Organic Farming: An Effective Way to Promote Sustainable Agriculture Development in India" The study reveals the possibility of espousing Organic agriculture as an effective strategy to promote sustainable agriculture in India. A sustainable agricultural sector strategy can contribute to a broader development of agricultural productivity, food security, generation of rural employment and poverty reduction while promoting the conservation of the natural resource base.

**Nazeerudin (2016)** examined "Organic Farming in Karnataka: Practitioners Perspectives" objective of the paper is to review the need assessment of the contemporary alternate agriculture and to find out perception about meaning of organic farming and specific features of organic farming as understood by the farmers. This study used the primary data and purposive sampling the selection of sample organic farmers for the cases studies. The paper found that the personal attributes towards environment quality of agro eco system and food security are the significant ecological factors which influenced and motivated the farmers to understand the unique features of organic farming where the micro-level sustainability of the farming system has been ensured.

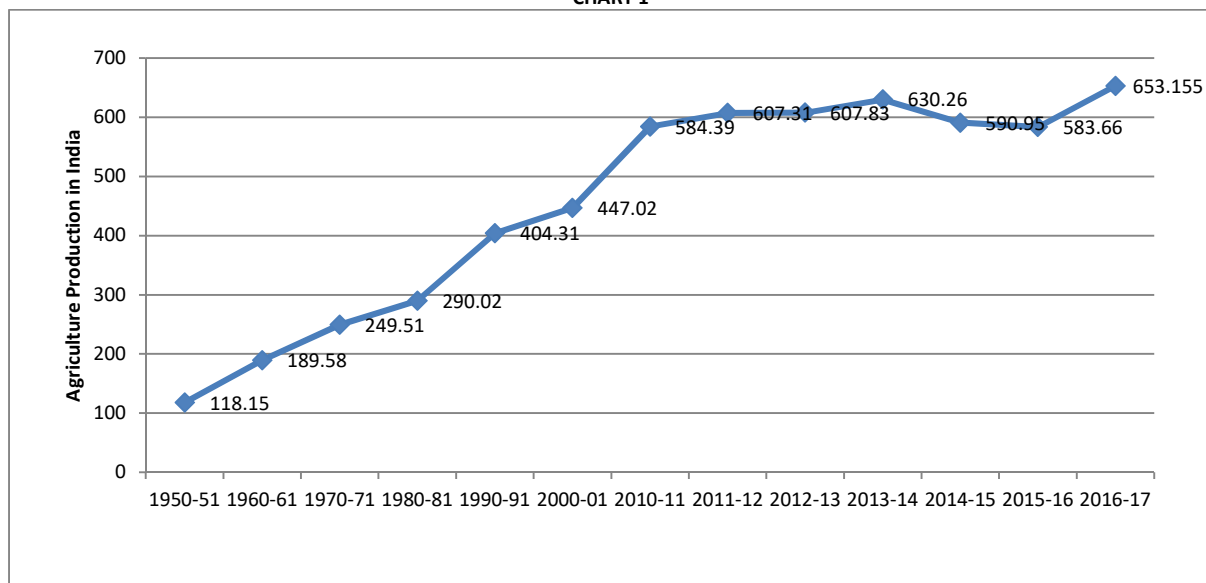
**AGRICULTURE PRODUCTION IN INDIA**

**TABLE 1: PRODUCTION OF MAJOR AGRICULTURAL CROPS IN INDIA (Million tonnes)**

Crops	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
<b>Food grains</b>	50.82	82.02	108.42	129.59	176.39	196.81	244.49	259.29	257.13	265.04	252.02	251.57	275.68
<b>Rice</b>	20.58	34.58	42.22	53.63	74.29	84.98	95.98	105.30	105.23	106.65	105.48	104.41	110.15
<b>Wheat</b>	6.46	11.00	23.83	36.31	55.14	69.68	86.87	94.88	93.51	95.85	86.53	92.29	98.38
<b>Maize</b>	1.73	4.08	7.49	6.96	8.96	12.04	21.73	21.76	22.26	24.26	24.17	22.57	26.26
<b>Nutri cereals</b>	15.38	23.74	30.55	29.02	32.70	31.08	43.40	42.01	40.04	43.29	42.86	38.52	44.19
<b>Pulses</b>	8.41	12.70	11.82	10.63	14.26	11.08	18.24	17.09	18.34	19.25	17.15	16.35	22.95
<b>Gram</b>	3.65	6.25	5.20	4.33	5.36	3.86	8.22	7.70	8.83	9.53	7.33	7.06	9.33
<b>Tur(Arhar)</b>	1.72	2.07	1.88	1.96	2.41	2.25	2.86	2.65	3.02	3.17	2.81	2.56	4.78
<b>Lentil(Masur)</b>	—	—	0.37	0.47	0.85	0.92	0.94	1.06	1.13	1.02	1.04	0.98	—
<b>Oilseeds</b>	5.16	6.98	9.63	9.37	18.61	18.44	32.48	29.80	30.94	32.75	27.51	25.25	32.10
<b>Groundnut</b>	3.48	4.81	6.11	5.01	7.51	6.41	8.26	6.96	4.70	9.71	7.40	6.73	7.565
<b>Rapeseed and Mustard</b>	0.76	1.35	1.98	2.30	5.23	4.19	8.18	6.60	8.03	7.88	6.28	6.80	7.98
<b>Soy Bean</b>	—	—	0.01	0.44	2.60	5.28	12.74	12.21	14.67	11.86	10.37	8.57	13.79
<b>Total</b>	<b>118.15</b>	<b>189.58</b>	<b>249.51</b>	<b>290.02</b>	<b>404.31</b>	<b>447.02</b>	<b>584.39</b>	<b>607.31</b>	<b>607.83</b>	<b>630.26</b>	<b>590.95</b>	<b>583.66</b>	<b>653.155</b>

Source: Directorate of Economics and Statistics, DAC and FW

**CHART 1**



The above Table.1 and diagram shows the agriculture production trends in India. Agriculture is the back bone of Indian economy. Agriculture Sector share of GDP is 15.4%. Agriculture production which was 118.15 million tonnes in 1950-51 was consistently increased till 2013-14. In 2014-15 there was a dip in the total production from 630.26 million tonnes to 590.95 million tonnes which later recovered to 653.15 during 2016-17. There is a substantial increase in the overall production but the rate of increase has been very less and in some years it was negative also. This seems to be a threat to sustainability of agriculture.

**PUBLIC SECTOR WAREHOUSING AGENCIES IN INDIA**

At the present, there are three main agencies in the public sector in India engaged in the field of building large-scale storage infrastructure and warehousing namely;

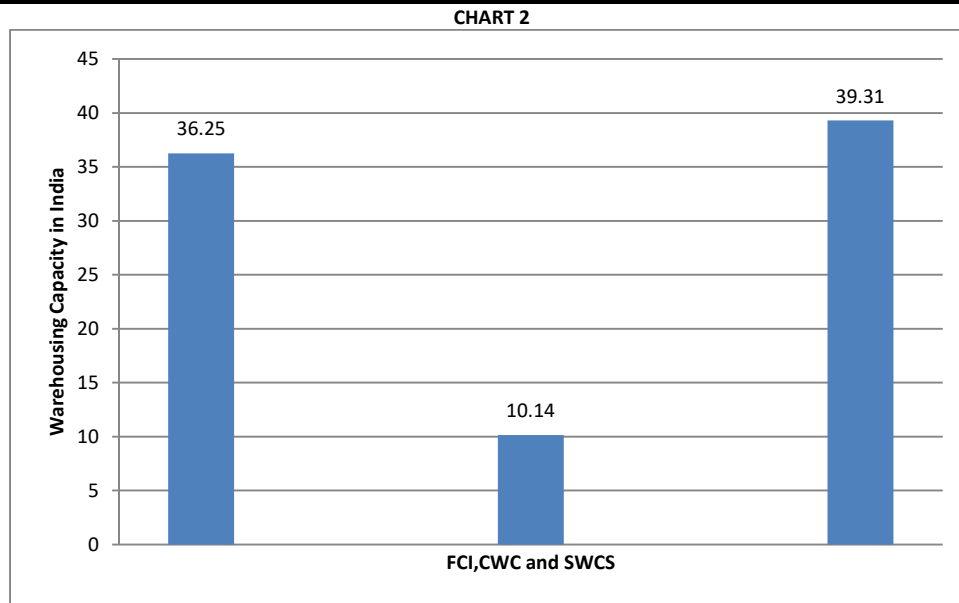
- Food Corporation of India (FCI).
- Central Warehousing Corporation (CWC) and
- State Warehousing Corporations (SWCs)

The Food Corporation of India (FCI) is the main agency responsible for the execution of food related policies of the Central Government. The function of Food Corporation of India primarily relates to the procurement, storage, movement, transportation, distribution and sale of food grains on behalf of the Central Government.

**TABLE 2: CURRENT STATUS OF WAREHOUSING CAPACITY IN INDIA AS ON 2018**

Sl. No	Name of the Organization/Sector	Storage Capacity in Million tonnes
1	Food Corporation of India (FCI)	36.25
2	Central Warehousing Corporation (CWC)	10.14
3	State Warehousing Corporations(SWCs) and State Agencies	39.31
	<b>Total</b>	<b>85.7</b>

Source: FCI portal, Department Food and Public Distribution, Government of India Portal, Assocham-National Summit on Warehousing in India and the Directorate of Agricultural Marketing and Inspection, Government of India



The Above Table.2 and diagram shows that the Current Status of Warehousing Capacity in India as on 2018. The State Warehousing Corporations (SWCs) and State Agencies own 39.31 Million tonnes is highest storage capacity beyond that all the sector. Then Food Corporation of India (FCI) own 36.25 Million tonnes warehousing storage capacity in India. The Central Warehousing Corporation (CWC) 10.14 Million tonnes warehousing storage capacity in India.

**TABLE 3: WAREHOUSING CAPACITY OF THREE MAJOR PUBLIC SECTOR UNDERTAKINGS IN INDIA** (Capacity in Lakh MT)

Year	FCI	CWC	SWCs	Total
1998-99	191.56	72.28	113.89	378.93
1999-00	254.08	73.48	123.74	452.61
2000-01	314.26	74.79	149.05	547.22
2001-02	279.01	83.91	185.49	553.67
2002-03	265.87	89.17	199.31	556.32
2003-04	236.65	91.14	199.85	530.66
2004-05	233.70	93.59	200.38	535.95
2005-06	255.56	101.87	197.05	552.99
2006-07	252.57	100.38	192.20	546.97
2007-08	238.94	102.20	187.32	525.04
2008-09	252.79	98.78	196.87	554.91
2009-10	288.36	105.25	209.26	603.60
2010-11	288.36	103.51	216.12	504.48
2011-12	316.10	100.32	228.37	544.47
2012-13	336.04	102.34	250.93	586.97
2013-14	377.35	105.55	266.96	644.31
2014-15	368.8	106.21	270.95	639.75
2015-16	356.63	115.11	270.03	626.66
2016-17	357.89	99.65	270.04	627.93

Source: Annual Report of Ministry of Consumer Affairs and Public Distribution, Government of India

The above Table 3 indicates that the total warehousing capacity in India held by three major public sectors. The capacity held with FCI undertakings as on 1998-99 was 191.56 lakh MT (metric tonnes) and the capacity as on 2016-17 was 357.89 lakh MT (metric tonnes) and Food Corporation of India holds the major share of the total capacity. The capacity held by Central Warehousing Corporation as on 1998-99 was 72.28 lakh MT while the capacity of CWC in the concluding year of the 2016-17 was 99.65 lakh MT. The state warehousing corporations is the second major capacity holder among the three public sector undertakings. The capacity held with state warehousing corporations as on 1998-99 is 113.89 lakh MT and the capacity as on 2016-17 is 270.04 lakh MT.

The total warehousing capacity held with the three public sector undertakings in the concluding year of the study stood at 627.93 lakh MT in the year of 2016-17. The data reveals trends in the FCI, CWC and SWCs Capacity in India. All Warehousing Organization of FCI, CWC and SWCs shows the fluctuation trend.

**TABLE 4: YEAR WISE AGRICULTURE PRODUCTION AND WAREHOUSING CAPACITY IN INDIA**

Year	Agriculture production in million tonnes	Growth rate of Agriculture Production	Warehousing Capacity in Lakh MT	Growth rate of Warehousing Capacity
1990-91	404.31	0.00	328.04	0.00
2000-01	447.02	0.095544	547.22	0.400534
2010-11	584.39	0.235066	504.48	-0.08472
2011-12	607.31	0.03774	544.47	0.073448
2012-13	607.83	0.000856	586.97	0.072406
2013-14	630.26	0.035588	644.31	0.088994
2014-15	590.95	-0.06652	639.75	-0.00713
2015-16	583.66	-0.01249	626.66	-0.02089
2016-17	653.155	0.106399	627.93	0.002023

Source: Annual Report of Ministry of Consumer Affairs and Public Distribution, Government of India

The above table.4 shows that The Rate of Growth of Agricultural production and the warehousing capacity growth rate were studied to know their consistent growth over the year's. The agriculture production growth rate in 2000-01 was just 0.009% which got better in 2010 but worsened in almost all other years. On the other hand, the warehouse capacity increasing in even worse rate and negative in many years.

The data finally concluded the fluctuation trend of Growth rate of Agriculture Production and the fluctuation trend of Growth rate of Warehousing Capacity. Both are not positive enough to maintain agriculture sustainability.

## **CONCLUSION**

The paper discussed the Agriculture production and warehousing capacity in India. It identifies and compares the growth rate of warehousing capacity and the growth rate of Agriculture production which is increasing but at a very low pace leading to a threat to agricultural sustainability. If agricultural production increases in a greater pace and the produce are protected in better warehouses, then there is no food scarcity in the country and also no threat to the agriculture prices. For this both farmers and government should take proper measures. There is hope for positive changes as more and more farmers are becoming open-minded and government is coming up with new initiatives. The study recommends that problems – largely institutional, structural, and administrative – need to be overcome for development in general and sustainable agricultural development in particular.

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