CRITICAL GAPS IN WAREHOUSES AND COLD SUPPLY CHAINS IN INDIA AND IMPLEMENTABLE MODELS TO BRIDGE THE GAPS

GAJULA PRAVEEN KUMAR, DR. VIJAYA LAKSHMI MOHANTY

Abstract: There are different types of warehouses, and cold storage is one of those, which plays a pivotal role in storage of farm produces. Cold supply chain forms the backbone of all kind of perishable products. India, being one of the major food producing country faces a huge challenge to reduce its post-harvest loss as well as to make all kind of food products available at different corners of the country. This study aims at studying the characteristics of two cold chains of different type of food products and knowing the major challenges faced by the cold storages. This study deals with a comparative study focusing on the problems faced by two consumable products in two states of country Andhra Pradesh and Odisha. A comparative study was conducted with the help of interview and structured questionnaire based approach to get the insight from these places based on which an analogy is drawn. Through this study, it is proved that in a single sector there is a great requirement of a customized supply chain strategy for different kind of products.

Keywords: Cold Chain, Cold storages, Comparative study, Logistics, Perishable products, Post-harvest loss

Introduction: Cold Storage: Cold chain is a logistic system that provides a series of facilities for maintaining ideal storage conditions for perishables produces from the harvest to consumer destinations. In the food supply chain and type of warehouses like Public Private Bonded, Government Cooperative, Integral Cold Storage Department (ICD), Cold Chain, etc. These are essential for extending the shelf life, increased duration of marketing period, avoiding over capacity in transporting, reducing transport bottlenecks during peak period of production and maintenance of quality of produces. The development of cold chain industry has an important role to play in reducing the wastages of the perishable commodities, which in turn will provide remunerative price to the growers. Cold storages are immensely beneficial for sensitive horticulture products as well. The cold chain refers to the transportation of temperature sensitive products along a supply chain through thermal and refrigerated packaging methods and the logistical planning to protect the integrity of these shipments. It is also defined as a logistic system that provides a series of facilities for a climate-controlled environment consisting of storage and distribution activities that maintains the product in an ideal ambience from the point of origin to the point of consumption. There are two main components of the cold chain logistics system:

(a) Surface storage: Refrigerated warehouses for storage of perishable product in consideration

(b) Refrigerated transportation: Refers trucks, containers etc. for transport of perishable products.

Literature Survey: India has the second largest arable land in the world and is amongst the top three in almost all food related agriculture production. India is the largest producer of milk, second largest producer of fruits and vegetables,and 3rdlargest producer of food grains. But, unfortunately, a negligible amount of these agro produces get processed. Hence, India has a great prospect for growth in food processing sector. However, the concern is the heavy wastage of food products during its transit and storage between the primary producer and end consumer. The amount of fruits and vegetables wasted is huge and amounts to 40% of the total production. Hence there is a pressing need to keep a check on the post-harvest loss. This is only possible if the transit facilities can be improved i.e. the cold chain can be improved. In the light of the above factors, this paper tries to analyses the current practices of the cold chain in India, finds the gaps in their performance and suggests improvements so that the cold chain in India can be developed better and it can enter into a growth phase.

Research Scope: The cold chain industry has its application spread across various domains and geographical locations. This study is limited to the agro-industry only. The primary research is conducted with experts who are in the industry and operate links in the cold supply chain. The concentration was mainly on the cold storage owners in Guntur Andhra Pradesh who deal with Chili's, onion, vegetable distribution and Bhubaneswar, Odisha for fruits and vegetables. The secondary research covers the magazines, journal publications, articles, internet materials. The study also intends to analyse the companies providing cold chain service in India namely, GatiKausar, RK food land etc. The aim is to identify the external and internal factors which are major enablers of cold supply chain. This will not only ensure a better understanding of the same but will also emphasize the area of improvement in the chain. Thereby, the waste will be reduced, quality will

be maintained and the consumer will get better products.

Objectives:

1. Identifying the problems facing by the cold storages.

2. Implementable models and engaging the farmers throughout the year, from farming to cold storage benefits

Importance of Cold Supply Chain in India: India's agricultural production is one of the highest in the world and being the second largest country the consumption is also among one of the highest. Moreover, there is a scope for export as well. If we have state of art cold supply chain, we can not only address the food crisis of the country but also increase income of the producers and suppliers. Some of the important facts that are worth mentioning in this context of the study are as follows: 1. More than 52 percent of India's land is cultivable. 2. India produces 63.5 million tons of fruits and 125.89 million tons of vegetables per annum. 3. India is the largest producer of milk, i.e., 105 million metric tons per year. 4.India produces 6.5 million tons of meat and poultry, as well as 6.1 million tons of fish every year. 5. The perishable products transaction volume is estimated to be around 230 million metric tons. 6. The spoilage of almost 40 percent of its total agricultural production. (FAO, 2014)

Cold Storages in Odisha: The total cultivation land in Odisha for vegetables, crops and others are 6, 77,331 Ha and the total agricultural production is 9,42,5208 MT. Apart from that, in the mushroom production, there is 80,895 Quintals of paddy mushroom and 84,430 Quintals of Oyster Mushroom (NHB). The twin cities of Odisha, Cuttack and Bhubaneswar are taken into consideration for the study.

A farmer is charged around 200 to 250 INR per day as a rent for a maximum period of 12 months. As soon as the bags arrive for storing, the bags are manually moved into the cold storage (by the labour who are contracted from time to time) and are arranged in the cooling chambers as per the layout plan. Lay put plan checks

The following:

(i) Quality Inspection Area

(ii) Weighing area

(iii) Cleaning area

(iv) Sorting and (v) Segregating.

If the workers finds damage in the fruits and vegetables they will segregate those to (vi) Rejection section and the premium quality will qualify for the (vii) Packaging section and (viii) Distribution Section. And the VeggieKart thrusts the accessibility of improved production technology for the producers, thereby developing a better supply chain mechanism to minimize the post-harvest loss and maintain good quality. This is achieved by creating a direct accessibility to market through VeggieMart (one-stop retail points) and VeggieWheels (vegetable cart vendors), helping the consumer in getting good quality produce. This initiative deals with selling vegetables and fruits through online purchase or on call purchase of vegetables, delivery at doorstep or pickup from the nearest VeggieMart or VeggieWheels. Thereby, making your everyday vegetables and fruits purchasing easier by ten manifolds. Also, Vegetables bought from us serve a social cause as fair amount of purchase goes for social development of farmer's family. One could track the farmer and his farm, where the vegetable is cultivated, enabling the consumer with rich access on how the produce is grown and harvested.

(Source: primary data from VeggieKart DC Manager)

Cold Storages In Guntur, Andhra Pradesh: Guntur Chilly yard is the Asia's largest chilly yard where 70,000 chilly bags worth Rs.35 Cr. arrive everyday it is located in the suburb of Guntur in Andhra Pradesh. It is the platform where different firms sell their chilies while various buyers (domestic and exporters) buy the chilies. colour and moisture of the chilies are two important factors that determine the quality and the price of the crop. Storing dried chilies in common godowns at homes results in avoiding selling at existing price in the market. But, this deteriorates the quality and results in low price in the market. Farmers expecting good price store the chilies to sell during the off-season. Hence, chilies are stored in the cold storages to preserve the quality, color and moisture of the chilies.

This process in Guntur is a Labour dependent process: A farmer is charged around 150– 175 INR per bag as a rent for a maximum period of 10 months. As soon as the bags arrive for storing, the bags are manually moved into the cold storage (by the labour who are contracted from time to time) and are arranged in the cooling chambers as per the layout plan. When the farmer wishes to take out his stock, the bags are again manually moved out as per the removal plan. A labour is paid 10-12 INR per bag for taking a bag inside and 8-10 INR for taking out a chilly bag. The demand for the cold storage space is varied across the year with more demand during off-season and less demand during the peak season

(Source: Collected from yard supervisor)

Issues & Challenges: A Comparative Study: For the cold storages at Cuttack and Bhubaneswar, the following are the major challenges: The cooling systems consume high amount of electricity and results in 25% of the maintenance charges. Though there are many measures taken right from the construction of the cold storage to insulate the walls

of the building properly and ensure high quality for thermal insulation using materials such as thermo-cool sheets, etc.

Table 1 Comparative study

Factors	Vegetable Cold Storage	Chilly-Cold storage
Place	Cuttack	Guntur
Geographical Description	Cuttack district is located in Odisha	Guntur district is located in Andhra Pradesh in the east coast of Bay of Bengal
Locational Advantage	Low	High
Demand pattern	Almost same throughout the year	Seasonal
Production	Up to the mark	High
No. of days can be stored	Demand based	8 months
Logistics care	High	low

a. Transport Infrastructure
b. Information Technology
c. Fragmented Market
d. Land Availability
e. Lack of Standardization
f. Lack of Trained Manpower
g. Uneven Distribution of Capacity
h. Rising Real Estate Costs

Implementable Models To Bridge The Gaps: To bridge the gaps, we need to analyse the entire layout of the plant,

Find out the SWOT:

Strengths: 1. there is an abundant availability of raw materials such as guava, mango, vegetables, ornamental plants & spices in proposed area of district. 2. The unit is situated in fruits/vegetable growing belt and having good network of growers. 3. Vast domestic market.

Weakness: Low availability of adequate infrastructural facilities.Lack of adequate quality control & testing methods.Inefficient supply chain due to a large number of intermediaries.

- High requirement of working capital.
- Seasonality of raw material.

Opportunity: Large crop and material base offering a vast potential for agro processing activities.

Rising income levels and changing consumption patterns.

Favorable demographic profile and changing lifestyles.

Availability of capital subsidy from NHM to start a business opportunity in local areas by converting their raw materials to value added products as per the local demands of the consumer /market.

Threats:

Affordability and preferences of fresh food.
High inventory carrying cost.
High packaging cost.
Natural Calamity.
Source :(NHB)

Government Initiatives:

(i) Development of Commercial Horticulture through Production and Post-Harvest Management of Horticulture Crops;
(ii) Capital Investment Subsidy Scheme for construction/ expansion/ modernization of Cold Storages/Storages of Horticulture Produce;
(iii) Technology Development and Transfer for promotion of horticulture;
(iv) Market Information Service for Horticulture Crops; and
(v) Horticulture Promotion Service National Centre for Cold Chain Development (NCCD).

NCCD has been mandated to:

(i) Provide an enabling environment for the cold chain sector to gain prominence and invite the much needed private sector involvement.
(ii) To establish standards and protocols related to cold chain testing, verification, certification and accreditation as per international standards.
(iii) To provide technical assistance to Financial Institutions, Government Departments/agencies, and industry for selection of cold chain component such as refrigeration units, refrigerated transport equipment, display cabinets, milk tanker etc.
(iv) To offer HRD and technical advisory services to personnel engaged in this sector. (Source: NHB)

Implementable Models: After doing the SWOT analysis, there can some suggestible models.

1, **Availability of raw material**- Name of the cluster and district along with the major crops have to be identified. Abundant quality of Potato, Onion, Mango, papaya, guava and all the vegetables available in the district, considered in the research universe as well as in surrounding area throughout the year.

2, Backward Linkage with farmers- With reference to either providing services or purchase of raw material, the promoter is also engaged in production of fruits/ vegetables as well as having good contacts with the progressive farmers of their area. The beneficiary has already its own raw materials for preservation & even though storage, facilities for proposed cool chamber. There is a sample number of farmers willing to provide their raw materials for same purpose

3, **Forward Linkages** – Analysis of domestic and export markets, tie up made for sale of the produce and branding aspect. Due to the shortage of availability of primary, sorted, graded produce for ultimate use of consumers to be sold in local export market. Thus there is ample of potential for more storages facilities at low cost preservation in that area.

Conclusions: The issues faced by both the supply chain are process specific.

Abundant supplies of vegetables and fruits to cold storages impact the cold chain of potatoes in Cuttack. Some of the steps in order to deal with the challenges faced at Cuttack and Bhubaneswar are discussed.

1. Quality can be maintained during construction of the cold storage. The walls of the cold storage are puff insulated for thermal insulation. Care should be taken right from the construction phase to make sure that the desired quality is ensured. In case, the walls of the cold storage are not properly insulated, the cooling systems consume more and more electricity to maintain the required temperature.

2. An elevator and conveyor belt can be used to reduce dependency. These cold storages depend heavily on the availability if labor for the movement of the goods that is expensive too. Hence, a conveyor belt that takes the trays into the cold storage and an elevator that carries the bags between each of the stores in the cold storage. 3. This is a one-time investment but the pay-back period can be very less (within 2-years) as almost Rs. 20 lakhs is expensed for labor wages. The use of automatedmovement of the goods first ensures that the goods can be taken in and delivered back irrespective of the availability if the labour, which increases the goodwill of the cold storage. In addition, the expense on the wages can be decreased significantly, while the annual maintenance charges of the conveyor belt and the elevator costs lesser than the annual labour wages.

4. Solar panels can be installed to power the conveyor belt, elevator and the cooling systems.

In this project, we have studied the importance and necessity of the cold supply chain in agro sector such as fruits, vegetables, etc. As discussed, there are many challenges that this supply chain faces in terms of awareness and infrastructure availability. Due to this, in India, there is a significant shortage of the cold supply chain services. This can be only be addressed if every sector gets ready to deal with challenges for its different product in a different manner. A focused approach is very much required in this case as a generalized approach will not help in mitigating the **present gaps i**n the cold supply chains for various products across India. This study proves this point clearly.

References:

1. Uma Aulwar, Awasthi R.S., Optimization of Process Parameters for Production; Life Sciences International Research Journal , ISSN 2347-8691, Volume 1 Issue 1 (2014): Pg 37-41
2. Agrawal D K (2005), Textbook of Logistics and Supply Chain Management,
3. MacMillanIndia Ltd., New Delhi.
4. Aneeshmatapurkar& Arnav Sinha (2011), Infrastructure Today, April
5. Baldiwala, Q. (2001) Developing a global supply chain,Logistics Spectrum, 35, 25–9.
6. *Ranjana Ganesh Khade,* Biodegradation of Tannery Effluent By *Aspergillus* Spp; Life Sciences International Research Journal , ISSN 2347-8691, Volume 2 Spl Issue (2015): Pg 243-249
7. Bhardwaj Sunil and PalaparthyIndrani (2008), "Factors Influencing Indian SupplyChains of Fruits and Vegetables: A Literature Review", The Icfai University Journal of Supply Chain Management, Vol. 5, No. 3, pp. 59.
8. Julian Parfitt, Mark Barthel and Sarah Macnaughton(2012), Food waste within food
9. supply chains: quantification and potential for change to 2050
10. JitendraRathore, Anmaika Sharma, KaruneshSaxsena (2010) , Cold Chain
11. *V. A. Shinde, S. M. More, S. B. More, M. M. V. Baig,* Optimization of Cultivation Conditions ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 43-48
12. Infrastructure for Frozen Food: A Weak Link in Indian Retail Sector., IUP Journal of Supply Chain Management; Mar2010, Vol. 7 Issue 1/2, p90-103
13. Postharvest Management of Fruit and Vegetables in the Asia-Pacific Region (2004),
14. FAO
15. Dr. Chithambaram Chandrasekaran, Dr. D. Krupa Daniel, A Case Report Study on Anomalous Development of Sciatic Nerve; Life Sciences International Research Journal , ISSN 2347-8691, Volume 1 Issue 2 (2014), Pg 496-502

Gajula Praveen Kumar, Research Fellow, Agastya International Foundation. India
Dr. Vijaya Lakshmi Mohanty M.A. (Pub. Admn), GM; Ph. D, HOD (PR & CSO) Sri Sri University