COLD CHAIN REPORT 2021 VII INR 1700
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Riding the Cold Wave

A knowledge report on Indian cold chain logistics

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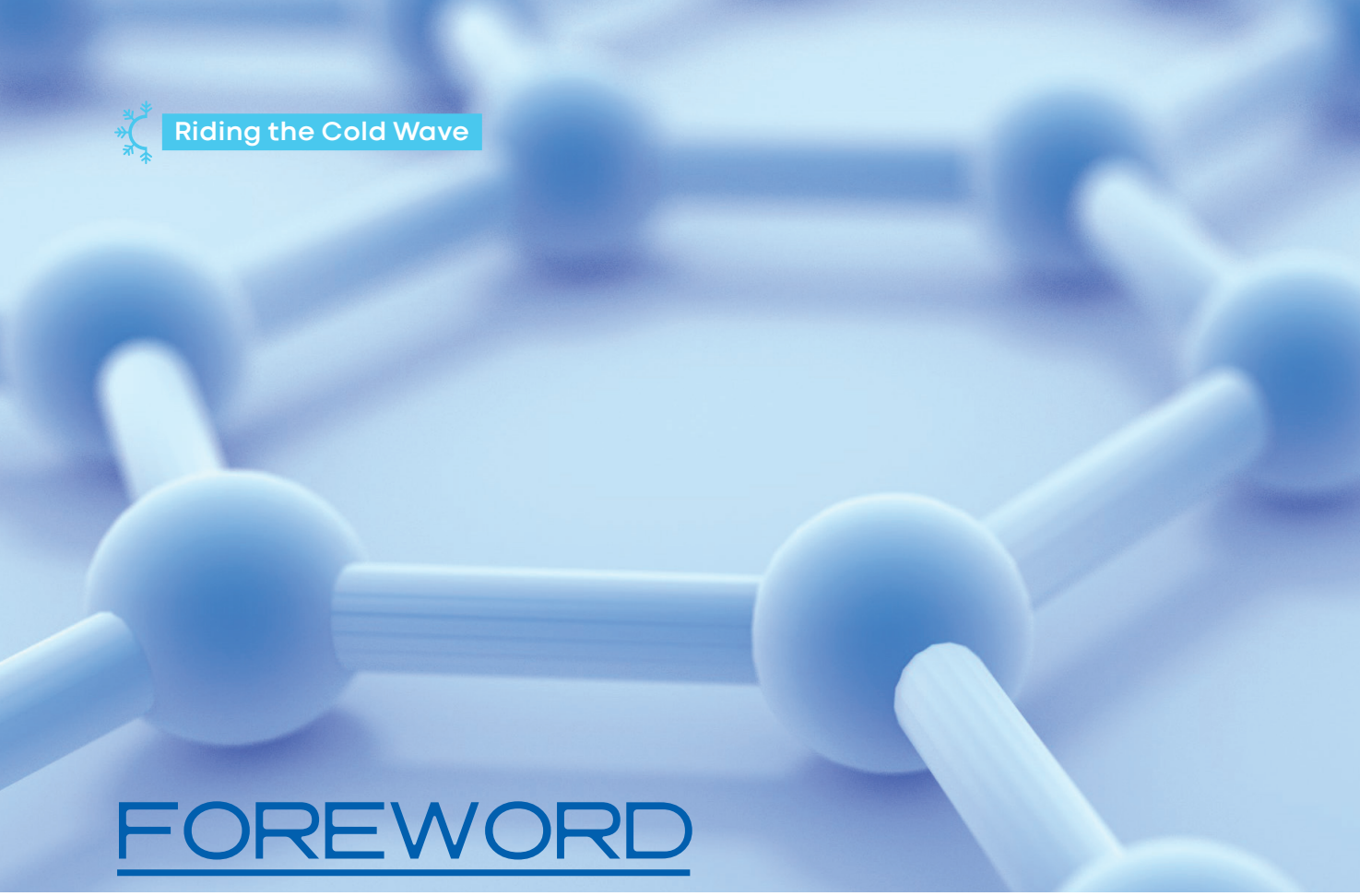
CONTENTS



FOREWORD

The story of cold chain logistics has remained much hyped since last one decade, but the gap between actual implementation and hype is too high. Inspite of registering double digit growth in previous years, market size of cold chain logistics is less than $5 bn. Still in storage volume terms potato commands significant dominance over other categories, but going forward the growth is expected to fueled by healthcare, food processing and organized retail industry. Increasing regulatory compliance requirements and higher consumer awareness and change in consumption habits are driving growth of cold chain industry. Latest change in farm bill may also support cold chain infrastructure creation. In new scenario stock limit on various agri produce will go away, which will incentivize storage in optimal quantity. Cold supply chain market is expected to grow at the rate of 15%+ in next five years. Impact of vaccine volumes due to COVID will give thrust to cold chain volumes, but it is expected to be a short lived phenomena for 2 years and in longer term market will normalize.

Cold chain logistics has two major services as temperature-controlled storage and temperature-controlled transportation, apart from other ancillary cold chain services which contribute less than 10% of industry size. Out of two major services, temperature-controlled storage segment occupies a major pie in revenue terms. One of the key reasons is potato storage. Contribution of potatoes in cold chain logistics revenue is tilted toward cold storages as these are stored in cold chain environment, but transportation takes place

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in normal temperature. In other categories, the ratio between transportation and storage market is not tilted one side.

The sector faces growth challenges due to high Capex, cost of energy and lack of standardization. IRR of any cold chain warehouse can be attractive only if its average capacity utilization is more than 80%. Which becomes challenging while dealing with seasonal products. On the other hand, poor customer awareness and non-stringent regulatory compliance on temperature consistency creates gap in growth story of cold chain logistics.

Growth of cold chain storage is backed by growing government push for augmenting cold storage infrastructure. Multiple initiatives of Government exist under schemes of MOFPI, NHB, NHM, APEDA and SFAC. Cold supply chain market in India is highly unorganized and fragmented. Gradually it is slowly moving towards organized sector, as it is capex heavy business requiring high degree of accuracy. Some of the leading players in India cold supply chain are Snowman Logistics, Cold ex, Cold man, Crystal Logistics, RK Foodland, Kool-ex, DHL, Gubba Cold Storage.

This report consists of insights about Indian cold chain logistics, market size, economics of cold chain transportation and warehousing business, industry verticals, drivers of growth, challenges etc.

For the report, I would like to express my deepest appreciation to one of my team mate Mr Parth Gandhi for helping me on this report. We are extremely grateful to Mr Pavanexh Kohli - Founding CEO & Chief Advisor to DAC&FW, Mr Ashok Mirchandani – Former MD, Carrier Trasicold Asia Pacific, Mr Kiran Gubba – CEO Gubba Cold Storage, Mr Vikram Khurana - MD, Sheetal Parivahan, Mr Vishwas Balwatkar - General Manager, Hind Terminals and Mr Ajay Kumar - GatiKWE for their valuable inputs.

BACKGROUND

Cold Chain Logistics Industry in India has not yet matured to its potential so far. In spite of significant efforts by Government, this segment has not registered anticipated rapid growth in last decade. As per estimates of NCCD there is phenomenal gap in required infrastructure and available infrastructure. But this estimated gap has not shown any sign of significant price escalation. Structure of cold chain logistics industry is highly fragmented and semiorganized sector holds approx. 75%-80% of installed capacity. Even the largest players of industry have not reached to turnover of $100 Mn.

As a developing country, there is a rising middle class in the country. As the prosperity of the middle class increases, there is a rising demand to consume fresh and healthy products. This has resulted in development of new supply chain and disruption of the traditional models. High initial Capex, soaring land rates, weak supporting infrastructure are some of the impediment in fast adoption of cold chain.

India is one of the largest producers of agricultural commodities. However, the percentage share of India in global trade market is very low. This is because of high amounts of wastage. A Ministry of Food Processing Industries (MOFPI) report states that India produces more than 400 Million MT of perishables (horticultural produce+ dairy+ meat+ poultry + fish) every year^. However, the

wastage levels are significantly high ranging from 3% to 16% of the total produce of various categories (like F&V, Fish, Meat) with the highest wastage percentage in Food and Vegetables sector. Because of this wastage there is an estimated loss more than 90,000 Crore annual loss of agricultural produce. Also, there is a large gap in the sector for development of various cold chain related infrastructure such as Controlled Atmosphere (CA) storage, reefer ripening chambers, IQF, milk chilling and processing, etc.

In order to reduce the wastage, there is a need strong need to focus on the development of cold chain Industry. Additionally, there have been many reports and studies from various organisations but there is a contradiction in numbers stated by them. This has resulted in need of understanding of current cold chain scenario. Hence, a detailed effort to understand the market was undertaken at our end.

Limitation of report: This report has been prepared exercising reasonable care and judgment conforming to generally accepted practices. It is expressly understood that no detailed studies have been conducted and that the conclusions contained in this report are based on observations, information provided to us by others, and knowledge gained from completing other assignments of this type. This report is not intended to serve as a base for project feasibility report or business plan, all of which are beyond the scope and purpose of this report. The purpose of this report is to provide structured information about the sector only. Some of facts has been captured from publicly available sources, which has been duly declared in this report.

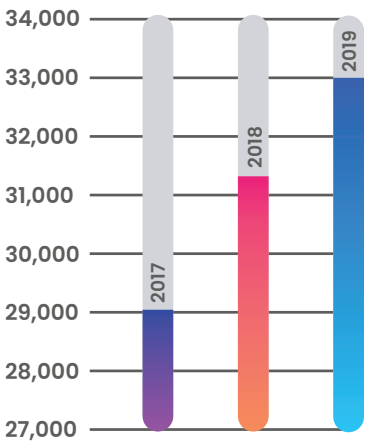
^Source MOFPI.NIC.IN

INTRODUCTION: MARKET OVERVIEW

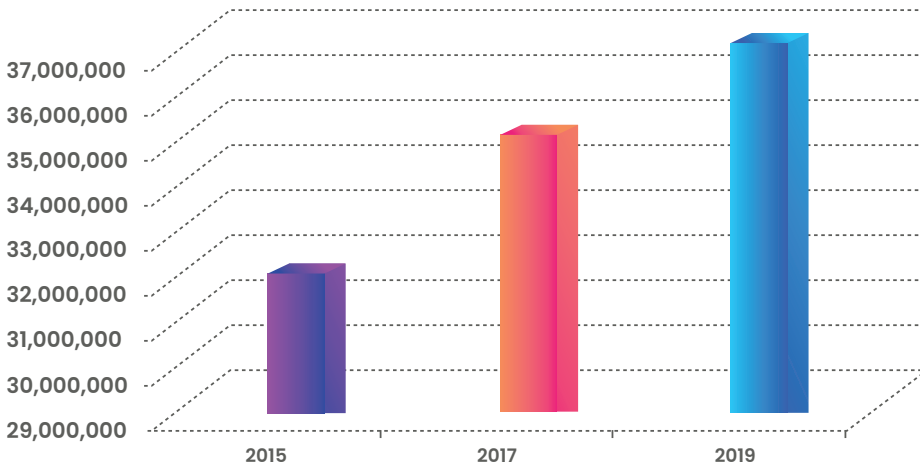
Cold chains logistics is essential for extending usable shelf life of produce, storing seasonal produce, maintaining product efficacy, reducing transport bottlenecks and maintaining quality consistency. Cold chain logistics solutions are widely used to transport and store fruits, vegetables, farm produce, meat and medicines. Global cold chain market is estimated at $185 bn in 2019 and it is expected to reach $585 bn by 2026 with a CAGR of 17%

Indian cold chain industry as of today is worth around 33,000 CR INR^ and is expected to reach 42,000 Cr INR by 2022 at a growth rate of 13-15%. Over the next five years expected CAGR of ~15% will be led by growth in the organized retail segment and food processing industry. Till now India falls under the category of poor cold chain penetration geographies and less than 20% of perishable produces utilize temperature-controlled facility. Such factors provide phenomenal scope for growth in the segment. In terms of volume, the cold chain industry in India estimated at around 36.4 Million tons of warehousing capacity and nearly 12000-1300 reefer HCV vehicles for long haul transportation. Organized sector has mere 20% share in cold chain warehousing and approx. 30% in temperature-controlled transportation. Organized sector is expected to grow much

COLD CHAIN INDUSTRY SIZE (FIG IN CR)



GROWTH OF COLD STORAGE IN VALUE TERMS



Estimated figure

faster than cold chain industry growth rate due to consolidation. In India, the cold chain warehousing capacity is mostly dominated by farmgate / potato storage (which forms less than 70% of the capacity) and the remaining is distributed among dairy products, fruits & vegetables and marine foods.

^Excluding mini captive cold rooms / storage

Cold chain is a combination of temperature-controlled transport, warehouse and supply chain. It refers to the temperature controlled (ambient or cold or frozen) solutions in order to maintain the quality of products, such as fresh fruits & vegetable, frozen food, chemicals, and medicines. The process involves the utilization of temperature-controlled warehouses for

storage and refrigerated vehicles for products' transportation. Transportation modes used are refrigerated trucks, refrigerated marine containers, and temperature controlled air cargo. For our study we have categorized Cold chain logistics industry in three components:

1. COLD STORAGE
2. COLD CHAIN TRANSPORTATION
3. OTHER SUPPORT SERVICES

COLD STORAGE / WAREHOUSING

The purpose of cold storage is to make sure that the products are stored under the necessary environmental conditions thereby maintaining its quality as well as extending its shelf life. The cold stores/warehouses can be classified as follows:

BULK COLD STORES
These are temperature controlled warehouses meant for bulk storage of various products. These are normally constructed in areas close to source of production and are usually used for single commodity items.

MULTIPURPOSE COLD STORES
Such cold storage can store multiple items across multiple temperature zones thereby functioning as a distribution hub.

SMALL COLD STORES
These are storage rooms with precooling facilities and are majorly used for export oriented items such as grapes.

FROZEN FOOD STORES
These are used for storage of frozen food and are used in growth of frozen food sector, domestically as well for exports.

CONTROLLED ATMOSPHERE (CA) STORES
In these cold stores along with temperature and humidity, the atmospheric gaseous contents are regulated. These stores can be used for dry commodities as well as fresh fruits and vegetables.

MINI UNITS
These are walk in cold stores used in hotels, restaurants, malls, etc.

In terms of installed capacity 68% belongs to potato and farm gate segment, while 32% is dedicated to other product categories. Normally multi product facilities are having better infrastructure than potato storage warehouses. Accordingly realization per ton / per pallet varies a lot between both sub segments of cold chain warehouses.

Out of the total cold chain industry, cold storage is worth two third of the total size in terms of value. In warehousing, in terms of value, potato and farmgate contributes approximate 50% of INR 23,000CR market.

MARKET SIZE: COLD CHAIN LOGISTICS

^Estimate based on discussion with industry experts.

Cold storages are chambers due to which controlled environment storage can be achieved using appropriate thermal insulation and efficient refrigeration system. Total cold storage capacity in India at present is estimated to be around 37 Million Metric Ton and is estimated to be growing at CAGR 15%.

Riding the Cold Wave

Cold chain extends the shelf life of the commodity. The cold chain application is divided broadly into four parts i.e. Frozen (Below -18C), Chill (0 to 10 C), Mild Chill (10 to 20C) and Normal (Greater than 20C). Various products of various commodities fall under different parts. So for instance, vegetables are mostly stored in chill category. Below is the list of temperatures to be maintained for some of the different commodities:

FROZEN (BELOW -18C)
- Frozan Vagatables
- Fruit puip
- Pineapple slices
- Ice cream
- Meat & Fish Product

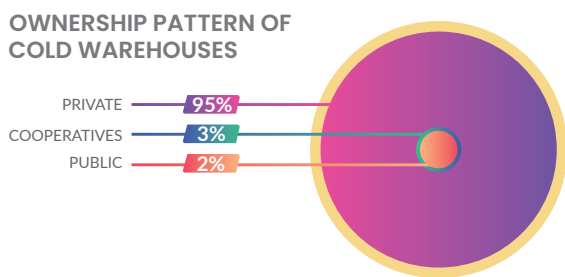
NORMAL (GREATER THAN 20C)
- Onions
- Dehydrated foods
- Roasted foods
- Sun-dried products
- Pickle, jams & jellies
- Ready-to-eat food
- Oils & extracts

CHILL (0 to 10C)
- Fresh fruits like apple, pears, etc
- Fresh Vegetable potato, carrot, etc
- Raw,Pasteurized milk
- Butter, Eggs
- Dry fruits/Nuts
- Dry Chillies

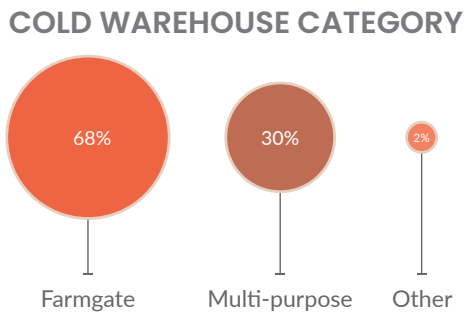
MILD CHILL (10 to 20C)
- Sub-tropical fruits like mango, banana, etc
- Dairy products like milk powder
- Chocolate
- Seeds

source: pib.gov.in

Use of cold chain has wide range of advantages from increasing food quality to extending the shelf life of the various products. 95% of the cold storages are owned by private sector. The rest is composed of a combination of public and co-operatives. Below is the percentage distribution of cold storages:



Majority of cold storages in India are single commodity potato forms the dominant warehouses are old and technology. However, the built are generally multi- to avoid over-dependency other segment mainly warehouses of sectors such



warehouses out of which share. This single commodity lack the use of modern new warehouses that are being purpose as investors are trying on a single commodity. The consists of single commodity as sea-food, pharma, etc.

STATE WISE COLD STORAGE CAPACITY

(CAPACITY IN MT)

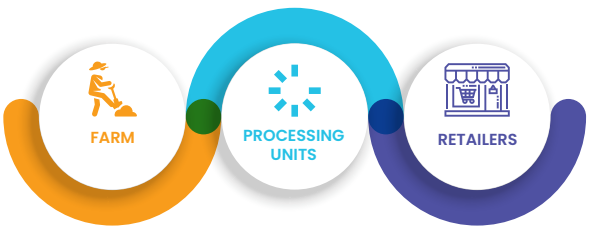
112516 Andaman & Nicobar Islands (UT)	1782561 Andhra Pradesh & Telangana	6000 Arunachal Pradesh & Telangana	157906 Assam	1415595 Bihar
12462 Chnadigarh (UT)	484087 Chhattisgarh	129857 Delhi	7705 Goa	5947561 West Bengal
2901807 Gujarat	7749830 Haryana	131017 Himachal Pradesh	112516 Jammu & Kashmir	238680 Jharkhand
560178 Karnataka	80405 Kerala	15 Lakshadweep (UT)	1263665 Madhya Pradesh	160419 Uttarakhand
4001 Mizoram	7350 Nagaland	540141 Orissa	85 Pondicherry (UT)	2155704 Punjab
555278 Rajasthan	2100 Sikkim	337625 Tamil Nadu	45477 Tripura	14176062 Uttar Pradesh

Source: Press Information Bureau 2017

This clearly indicates that 40.5% of the total cold storage capacity is located in the state of Uttar Pradesh and together with west Bengal it consists of 57.5% of the total capacity. Such a large number is because of the potato belt, i.e. potato storages located in the two states. Top five states for cold storage capacity are Andhra Pradesh and Telangana, Gujarat, Punjab, Uttar Pradesh and West Bengal and together they account for 77% of the total capacity.

COLD TRANSPORTATION

Cold chain transportation plays an integral role in ensuring smooth movement of various products. There is a huge difference in terms of proportionality between cold storage and transportation resulting in 85% shortage of reefers in India. The cold chain transportation is mainly carried by roadways. There is laxity in development of rail and air mode of cold chain transportation. Despite of the fact that India has such a large network of railways, the rail reefer transportation is still at a nascent stage and calls for a need for drawing a better strategy. The usual cold chain cycle consists of three steps:



It is very important to make sure that the products are not damaged. Hence, vehicles are equipped with refrigeration units which help in controlling temperature. These vehicles are classified as follows:

REEFER TRUCKS

These trucks are powered by integrated diesel driven motors, independent of the main truck engine. There are many different sizes of different trucks available on the market. Modern reefer trucks also contain GPS based location tracking system as well as sensors to monitor temperature and humidity.

REEFER CONTAINERS

They are multi-modal containers used for multi-modal activities i.e. where the container movement would involve rail-road-sea-air. It sources power from a separate generator.

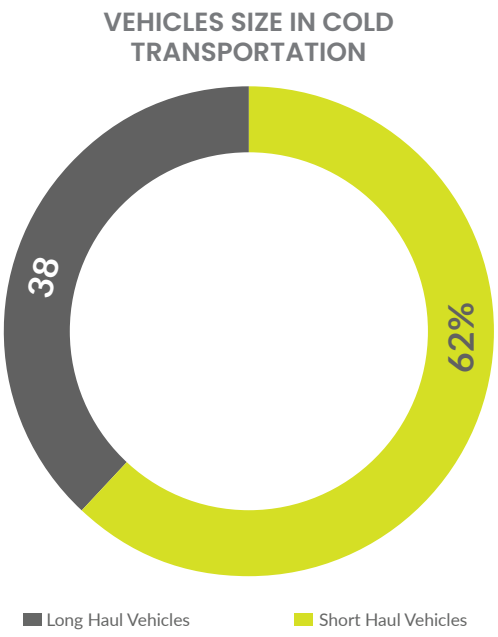
REEFER VEHICLES/SHIP

These are cargo vessel specializing in carriage of goods which require a specific temperature to be maintained. Each cargo carrying space is lined by layers of insulating material. Additionally, floor is double skinned so as to ensure the circulation of cooling air. Depending on type of cargo and the products, a temperature range of -30 to +12 degree Celsius is to be maintained.

The cold chain transportation sector is an integral part of the cold chain industry. It can further be divided into two parts:

1. LONG HAUL TRANSPORT
2. SHORT HAUL TRANSPORT

There are estimated 13,000 Long haul transport vehicles and 8,000 Short haul transport vehicles across the country. Total cold chain transportation capacity is growing at a CAGR of 17%. Additionally, there are more than 20000 insulated vehicles used for transportation milk, which carries chilled milk at 3 - 4 degree Celsius. However, they are not counted as a part of the total cold chain transportation market as the insulated transport vehicles are out of the scope of this study.



COLD CHAIN SUPPORT SERVICES

Other support and value-added services consist of multiple activities; some of them are as follow:

- INTERNATIONAL FREIGHT FORWARDING
- RIPENING CHAMBERS
- PACK HOUSES

International freight forwarding can further be divided into three parts:

1. AIR FREIGHT FORWARDING
2. OCEAN FREIGHT FORWARDING
3. LAND FREIGHT FORWARDING

The international freight forwarding market is prone to tariffs. Hence there is a great amount of uncertainty in it. Packhouses are an integral part of cold chain. As per the NCCD report of 2015, there are only 249 packhouses across the country whereas there is a requirement of 70,000 packhouses. Most of the packhouses are mainly serving fruits. There is a major lack of focus for packhouses for commodities other than fruits. Also, most of the existing pack houses lack the use of modern lack the use of modern technology. Maharashtra is the leading state for packhouses followed by Andhra Pradesh. According to NCCD report of 2015, there is an existing infrastructure of only 812 ripening chambers across the country but there is a requirement of 9131 ripening chambers i.e. there is a huge gap in the infrastructure. Ripening chambers in India are mainly used for only for Mango and Banana. Maharashtra and UP are hub of ripening chambers in India. The chain food service market is heavily reliant on commissaries. Commissaries have a major role of being key supply chain partners by helping maintain uniform quality and taste standards.

POLITICAL

1. Government plays a major role in not only enacting policies related to cold chain but also plays a crucial role as investors and promoter of investors
2. Land issues regarding acquisition of land for setting up cold chain infrastructure
3. Various subsidies and tax holidays play a major role
4. Risk of temperature excursion at ports, rail, ports and airports plays a crucial part

SCOPE OF THIS STUDY

1. Price plays a major role in selecting the service provider
2. Growing trend of offering an integrated cold chain solution
3. Low margin business which in turn leads to underinvestment and risk aversion
4. Customers are also expecting value-added services to be provided
5. Mergers and acquisition are resulting in industry getting more organized which thereby results in big companies leveraging economies of scale due to which customers can bargain more
6. Power / electricity costs are a major factor affecting bottom-line
7. Competitive rates often result in low margins
8. Single commodity players in warehousing space get highly affected by the seasonal trends and changes in the market
9. Investors have to often evaluate their investments on long-term basis since it is a high Capex business

SOCIAL

1. Customers expectation plays a major role in driving changes in the cold chain industry
2. Customers are increasingly expecting their products to reach in shortest possible time and produce to be fresh or potent
3. Finding skilled workforce and making sure they stay for long term is a challenge
4. Warehousing segment often requires large number of laborers depending on the size and space of the warehouse

TECHNOLOGICAL

1. Real time visibility and increasing role of control tower
2. Use of IOT devices to monitor the temperature of the products
3. GPS tracking and RFID technology
4. Web-enabled communication with customer

LEGAL

1. Weak adherence of regulatory framework in country
2. Weak Food and Drug safety monitoring in cold environment

ENVIRONMENTAL

1. Since there are relatively less incentive for using environment friendly refrigerant, which often leads to use of low cost refrigerant.
2. Cold chain warehousing companies heavily rely on power, thereby contributing to pollution

ECONOMICS OF COLD STORAGE

Cold Chain warehousing business is a capex led business. Creating a facility near consumption markets (Metro cities) is more costly due to high cost of land asset. For a 5000 pallet multi user-multi chamber facility land parcel of approx. 3 acres is required. On the other hand investments in civil works, Plant and machinery etc is as high as INR 30000 – INR 35000 per pallet.

On OPEX front, Power cost is biggest cost header. In frozen environment cost of power hovers around 20-35% of revenue. In cold chain warehousing projects average EBITDA is approx. 35%, subject to capacity utilization of 90%+.

In the cold warehousing segment service offering, service quality and pricing vary a lot between potato warehouse and multi product palletized ware house. One of the major factors for the variance is temperature category, as capex and opex are high in frozen cold storage.

Financial illustration: for a 5000 pallet multi chamber multi temperature cold warehouse

5000 PALLETS			
Particular	**Requirement**	**Cost***	**Unit cost/pallet**
Land required	3 Acre	40000000	8000
Central warehousing area	1.5 acre		
Parking and allied facility area	1.5 acre		
Civil Works (Technical & Non-technical)		90000000	18000
Plant & Machinery		55000000	11000
Other utilities development		1500000	300
Misc. & contingency		2500000	500
Total Project Cost		189000000	37800

* High level estimation

Particular	**INR**
Project Cost per pallet*	37800
Monthly Revenue from Operation per pallet #	1300
Annual Revenue from Operation (85% capacity utilization)	13260
Annual Operating cost (@70% incl P&A**)	9282
EBITDA per pallet per annum	3978

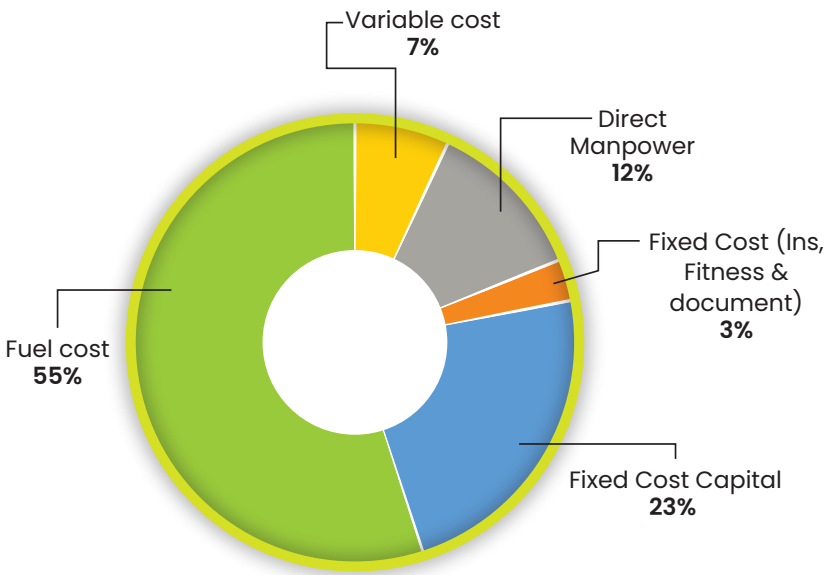
** Average EBITDA for multi-product palletized cold storage company
# Average revenue hovers approx 1100-1400 per pallet per month

ECONOMICS OF COLD CHAIN TRANSPORTATION

In transportation all major organizations have asset ownership model, outsourced vehicle model has not been successful so far. Success of asset own model depends solely on asset utilization. The vehicle engagement model in cold chain is different for large vehicles plying on long haul and small vehicle engaged in secondary distribution. So far none of dedicated part load business model has succeeded in cold chain transportation. Small portion of part load cold chain movement take place with cold boxes and gel packs in dry transportation, especially in pharmaceutical shipments.

Large vehicles are normally engaged for on trip basis from point A to point B for serving primary distribution or bulk movement. The vehicle engagement pattern is quite similar with dry trucking industry for one way. But in case of reefer vehicles most of terminating locations of trip does not have any load for cold chain. Due to which these vehicles move with dry cargo load at lesser rates or move empty to some other location for load which may be few hundred km from unloading point of previous trip. This model has a direct impact on pricing of reefer transportation because demand of reefer vehicles vary a lot from location to location. On considering industry level average running of a large vehicle, it hovers around 8000 Km per month with average realization of INR 45 - INR 50 per Km. Per Km realization varies on various factors like type of vehicles, trade lane and temperature category. In cold chain transportation direct operating cost hovers above 85% of revenue. For an example in a 16T multi axle vehicle direct operating cost hovers around INR 42 per Km (Excluding Toll) and out of this cost of operations around 38% is fixed and 62% is variable component. Weak control on operation makes the business unviable.

Contribution of cost drivers: 16 Ton (MXL)

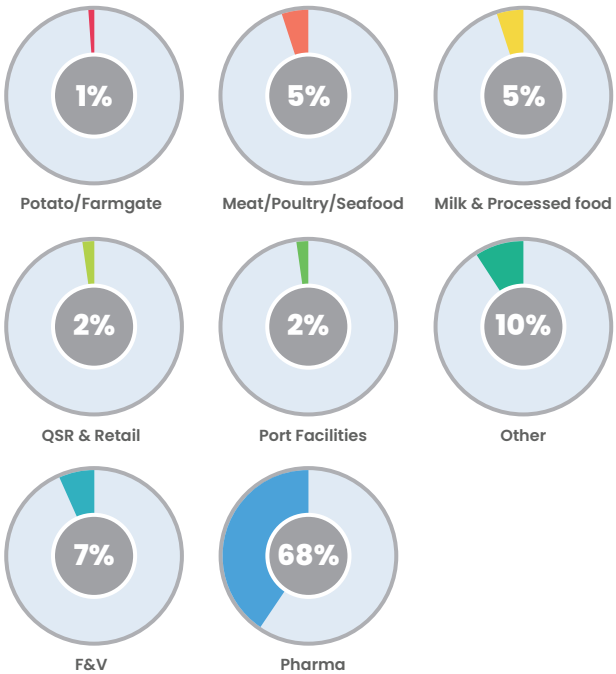


In case of secondary distribution vehicle configuration varies from 1T to 6T payload. Secondary distribution market is more fragmented than long haul vehicles. The size of this segment is also smaller. As per our research there are less than 8000 secondary vehicles on road. Usually engagement of these vehicles by service buyers is on a monthly attach model.

COLD CHAIN PRODUCT SEGMENT ANALYSIS

Since the cold storage takes up such a large share of the cold chain market, which comprises of multiple product categories. In the cold storage segment breakdown is as follows:

Product segment contribution in cold storage



[i] Fruit & Vegetable

India is second largest Fruits and vegetable producer with a production of 277 Mn MT. In 2017-18, India produced 97 Mn Tn of fruit, 180 Mn Tn of vegetable^. Despite being the leading producer. As per the data released by MOFPI the processing levels for fruits and vegetables are at mere 2%. Compared to processing levels our wastages are very high.

The overall percentage share of F&V for cold storage is 5% of the total i.e1,850,000 Mn Tn. This is excluding potatoes which will be treated as a separate commodity. The average realization rate is around 1000-1500/ton/month. The average rentals for fruits and vegetables will be 1400-1600/ton depending on the item. Below are the advantages of using cold storage for F&V:

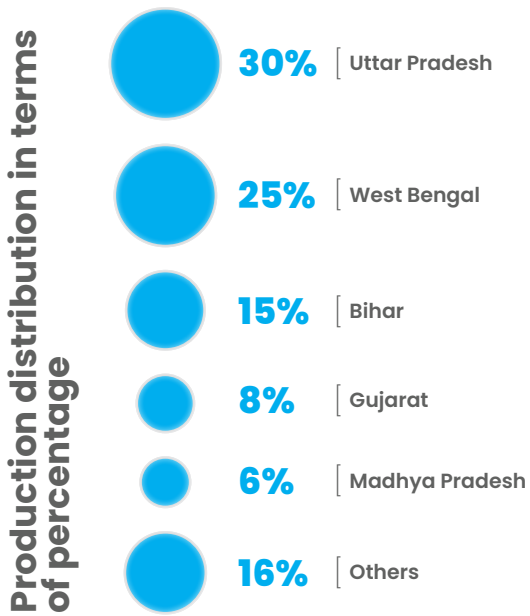
- Decreases activity of micro-organisms
- Reduces the loss of texture, flavor and nutrients
- Slows the process of ripening
- Reduces the natural senescence

[ii] Potato/Farmgate

The overall percentage share in cold storage of potato is 68% i.e. 25,160,000 Mn Tn. The rental realization rate of potato cold storage hovers in range of 500-750/ton/month. Most of the potato storage are single commodity warehouses. Top five potato producing states contribute most of the capacities (approx. 84%) of potato cold chain.

Except potato cold chain is still weak for farm produce. As per some high estimates, fresh produce wastage is almost to the tune of around 40%. With proper back end infrastructure support the opportunity lies in reduction of waste and to exports of some farm fresh produce.

^ *Source: pib.nic.in - All India 2017-18 (Third Advance Estimates) of Area & Production of Horticulture Crops*



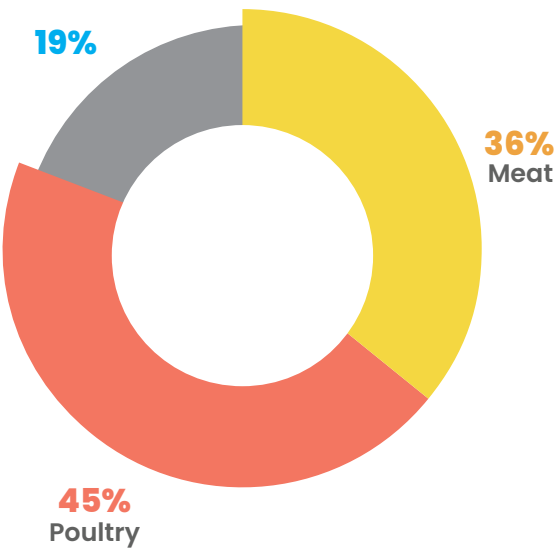
[iii] Poultry/Meat/seafood Segment

The total cold storage capacity of this segment is around 7% of the total 2,590,000 Tons. This segment consists of the three parts:

1. POULTRY
2. MEAT
3. SEAFOOD

India is the second largest poultry market in the world. The poultry market is however semi-organized and dominated by the wet market i.e. people prefer freshly slaughtered chicken as opposed to processed chicken meat. More than 90% of the sales volume comes from the wet market. Also, according to MOFPI, the processing level at present is only at 6% for the poultry market. Hence there is a huge scope of improvement.

Distribution Percentage



Since poultry occupies a major percentage share it is treated as separate commodity. India produces more than 100 Bn eggs annually. 64% of the total eggs production is produced from five states only: Andhra Pradesh, Tamil Nadu. Maharashtra, Punjab and Kerala.

According to MOFPI, India produces 5.3 million MT of poultry meat annually. The meat commodity consists of the following:

- BUFFALO MEAT
- GOAT MEAT
- SHEEP MEAT
- PIG MEAT
- OTHERS

A large chunk of buffalo meat is exported and significant market is in semi organized / organized sector while the sheep and goat meat segment are also very fragmented industry in which farmers sell their animals in live market to local traders and butchers. In pork meat segment, 95% of the meat is available in fresh form in wet market, which is unorganized. The processed sector mainly caters to demand from HORECA segment compromising of high-end hotels and restaurants in India. In last few years share of meat in cold chain logistics has decreased. Two primary reason for decline were tightening of norms related to slaughter and reduction in exports of meat from India. In past significant amount of meat was exported to Vietnam, which was subsequently exported from Vietnam to other geographies.

India is the second largest fish producing nation in the world. Fishing is composed of two segments:

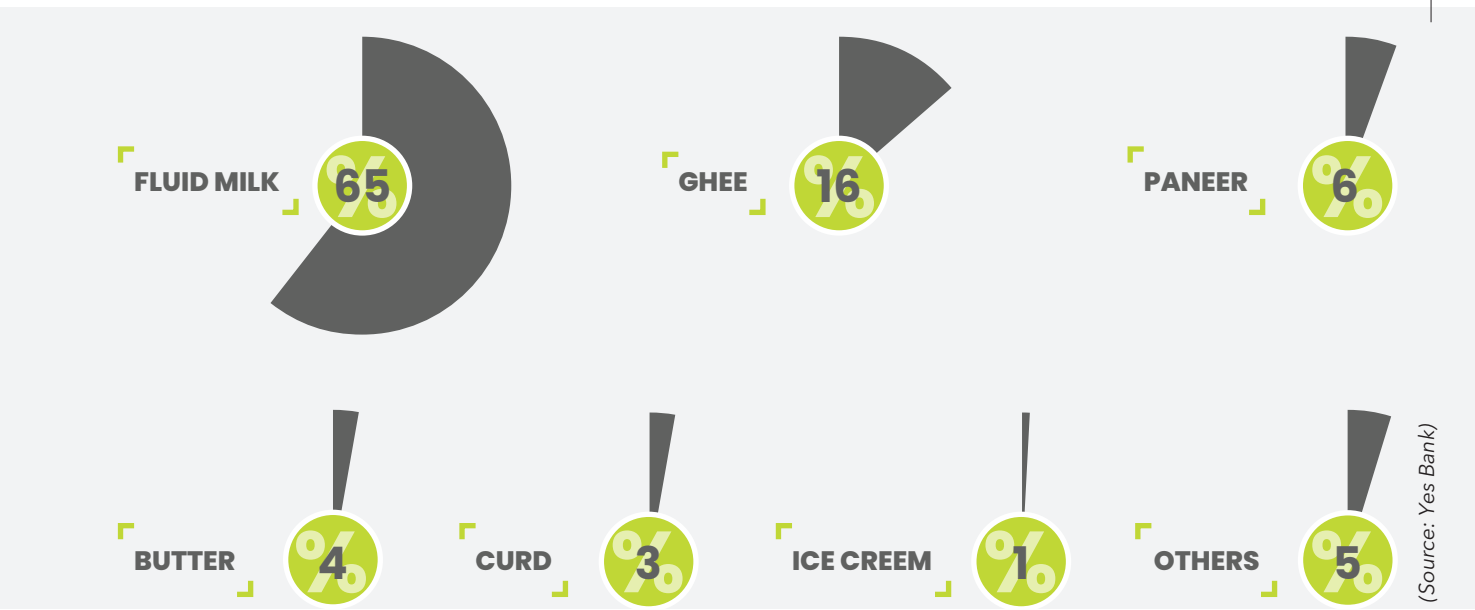
1. INLAND SECTOR
2. MARINE SECTOR

The fish production in 2017-18 was estimated to be roughly around 12.6 million Tn. Fishery exports from India is approx. INR 45000 Cr. Other than fishery, shrimps are another major source of export. In the coastal states of country, processing unit infrastructure for Fishery has been developed. These areas have a significant cold chain infrastructure to store the marine product. These facilities have been developed by few processing units for their captive use, while cold chain logistics companies have also invested in infrastructure in these locations. Andhra Pradesh and West Bengal contributes to approximate 50% of country's fishery production, which is followed up by states of Gujrat, Orissa, Tamil Nadu, Uttar Pradesh, Maharashtra and Karnataka.

[iv] MILK AND PROCESSED FOOD

The share of cold warehousing for milk products and processed dairy products is approximate 10%. India is the largest producer and consumer of milk globally with 20% share in global production. Domestic milk production is growing at the rate of 5% CAGR. Fluid Milk accounts for 65% of the total share, but majority of its volume is transported through insulated vehicles. So, milk has not been taken into consideration of this report. Growth in cold chain industry in dairy and milk products segment is driven by segments such as cheese, yoghurt, ghee, butter and ice-cream i.e. the value-added products. According to yes bank report, the fastest growing item is ice-cream, followed by cheese and paneer.

Overall the food processing industry offers massive opportunity. The food and Grocery market in India is sixth largest in the world according to MOFPI. The government has sanctioned 39 Mega Food Parks, out of which 18 Mega Food Parks have become functional. The government has allowed 100% FDI for food processing industries. Hence, food processing industry is poised for huge growth.



(Source: Yes Bank)

[v] PHARMA

India is the world's third largest producer of pharmaceuticals by volume. Low costs of manufacturing and government subsidies for biosimilars development makes India attractive for export related production. Pharma segment, especially biopharma is heavily dependent on the cold chain. Bio Pharma are expected to be major contributor because of strict USA

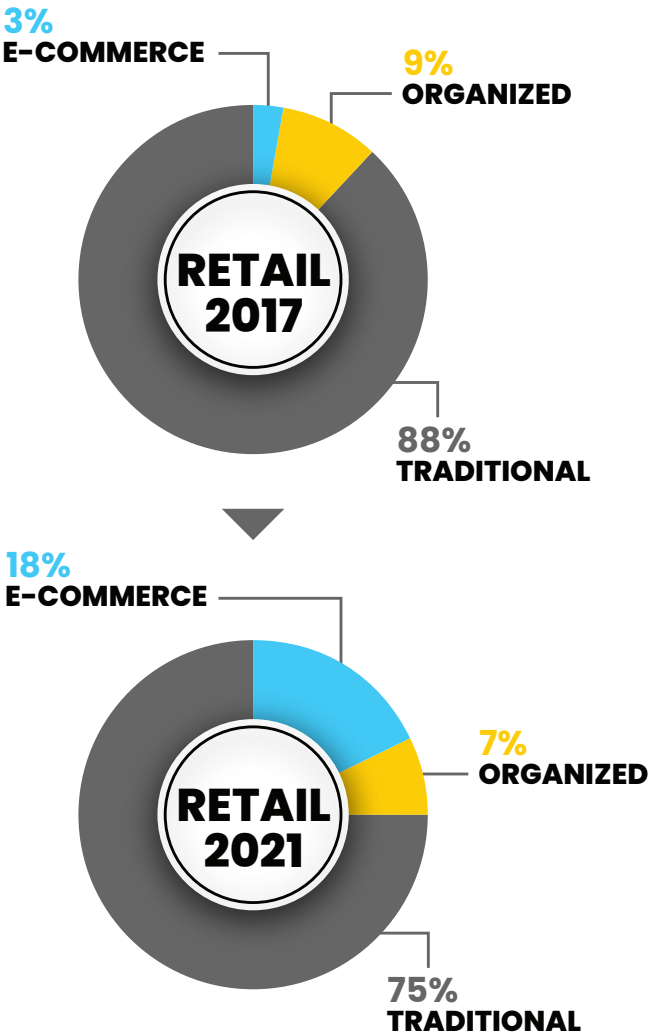
FDA regulations which make it necessary to monitor products such as vaccines, serums, blood plasma, and complex proteins. In 201-98, the total sales of bio-technology products as well as biopharma products were estimated to be around US$ 63 billion and is forecasted to reach US$ 150 billion by 2025. These products are temperature sensitive which heavily rely on the cold chain network for its efficient distribution. Pharma as a contributor in cold chain is growing rapidly and is expected to continue this trend in the future.

India's pharmaceutical industry is highly price sensitive especially in case of domestic business and many a time leads to a transaction based approach in decision making. Visibility in Cold chain logistics is very low post regional distribution warehouse.

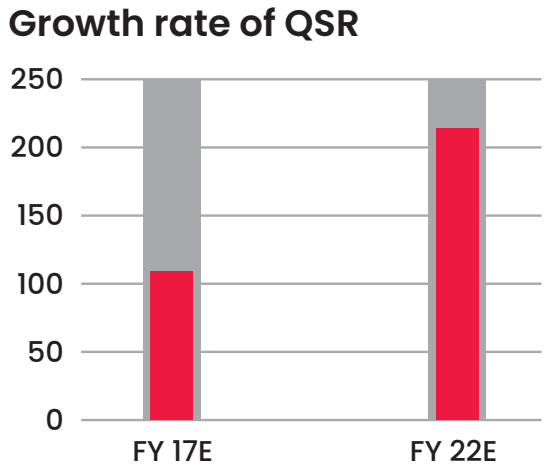
The total share of pharma sector in cold warehousing space is pegged at approximate 1%, but it is growing at higher pace. India's cost-conscious pharmaceutical industry is moving g towards a higher focus on quality, with the growth of the biologics industry. As a result, there is a higher demand for cold chain storage and warehousing. Demand for large warehousing facilities for pharmaceuticals is likely to increase. In 3-5 years, small players are expected to concede their market share to bigger players thereby bringing about a structural shift in cold chain infra. In the long run, warehousing will evolve into an organized segment. As per some industry estimates contribution of pharma sector in overall cold warehousing segment will double in this period.

[vi] RETAIL AND QSR

The Indian Retail market size was 58Tn INR in 2017. It is expected to reach 84 trillion INR by FY21E. The percentage distribution is as follows:



The chart clearly indicates that E-Commerce and organized retail will be major drivers of growth. Cold chain industry will gain as more and more retail sector becomes organized. This is due to the fact that organized retail companies will have to monitor the quality of the products strictly in order to ensure uniformity. Increasing urbanization and rise in income of middle class is resulting in growth of QSRs (Quick Service Restaurants) and the retail sector. This trend will in turn result in growth of cold chain industry. QSRs are going to be one of the top three drivers of growth of the cold chain industry.



The share of QSR/Retail segment of cold warehousing is 2%.

[vii] PORT FACILITIES AND OTHER INDUSTRIAL CAPTIVE FACILITIES

The port facilities are the facilities located near the port for exports or imports. They are used by mainly by segments such as pharma, seafood and F&V categories. Cold chain storage facilities are available in all international airports and sea ports. Even some of the facilities around seaports are dedicated to seafoods only. The port facilities contribution to cold storage is 2%.

Although few Airports have ramped up on site cold storage facilities, still many airports don't have any cold storage facilities as of now. In recent past few private airports like Delhi, Mumbai, Hyderabad and Bangalore have augmented the cold storage facility significantly.

Other captive cold storage facilities contribute to a 5% of total installed the cold warehousing facilities. Most of these captive facilities in industrial premises.

GROWTH DRIVERS OF COLD CHAIN LOGISTICS:

- The economic expansion of the middle-class has increased demand for cold chain products like fresh produce. Over the last decade, the focus in the food industry has moved to quality, nutrition and product integrity. A combination of a higher disposable income and general push to healthier products is driving higher demand cold supply chain.
- Rise in demand of processed and packaged food: Customers are increasingly buying packaged products for items such as cheese, meat, frozen potato products etc. Because of this, there is rise in demand for infrastructure to support upstream and downstream supply chain.
- Pharmaceutical manufacturers are focusing on the quality and product sensitivity. Increase in development of more complex biological-based drugs, shipments of hormone treatments, vaccines and complex proteins that require cold chain or controlled temperature, which has become a major growth driver for cold chain logistics industry. From 2011 to 2017, the number of temperature-sensitive healthcare products has increased by 45%, one in two healthcare products is shipped via the cold chain. These newer biological based medicines and vaccines are high-value pharmaceutical products and require shipping via the cold chain across the entire distribution network worldwide.

Since 2010, there is continuous growth in infrastructure of cold chain, but it is nowhere compared to estimated required infrastructure. On the subject NCCD published a comprehensive report "All India Cold Chain Infrastructure Capacity (Assessment of status and gaps) in 2015. The study estimated cold chain infrastructure requirement based on consumption pattern and its integrated supply chain framework. As per report's estimate there was huge gap between required infrastructure and created infrastructure as of 2015

Type of Infrastructure	Infrastructure Requirement (A)	Infrastructure Created (B)	All India Gap (A-B)	% share of Gap to Required
Pack-house	70,080 nos.	249 nos.	69,831 nos.	99.60%
Reefer Vehicles	61,826 nos.	9,000 nos.	52,826 nos.	85%
Cold Storage (Bulk)	341,64,411 MT	318,23,700 MT	32,76,962 MT	10%
Cold Storage (Hub)	9,36,251 MT			
Ripening Chamber	9,131 nos.	812 nos.	8,319 nos.	91%

-AICIC-2015-NCCD-

CHALLENGES

- **Cold storage:**

1. ***Land acquisition:*** **Even though cold storage involves minimum use of industrial affluent and generation of industrial waste, there is no fast track mechanism for obtaining change of land**

use i.e. from agriculture to industrial. This is a major hurdle in development of cold storage infrastructure across the country. Government can set-up a fast track land allotment mechanism which will result in improved infrastructure of cold storage.

2. ***Availability of Power:*** Availability of power is a other major hurdle in development of cold storage infrastructure across the country. Cold storages require power to make sure that the necessary environment of the product is maintained. Many cold storages are located at the farm-gate or near the point of production where availability of power is random and uncertain. Because of uncertainty in availability of power, many cold storages are forced to rely on fuel-based generators. This results in additional operations costs, thereby hampering the development of cold storages.

3. ***Lack of Standards and Protocols:*** There are various guidelines for handling various products which are not strictly enforced. Because the necessary technical standards are not followed, it results in lack of achieving optimum performance. Some products may even get damaged. Hence, proper training should be provided and the protocols to handle different products must be strictly followed.

4. ***Seasonal demand:*** Cold storage is used for storage of many different commodities. However, there are many commodities which have seasonal demand. For, e.g.: Mango. Because these products are in demand only during some time of the year, the storage capacity will either be unutilized or under-utilized i.e. it will hamper the overall productivity. This will have a strong impact on the bottom-line of the companies.

5. ***Storage facility location:*** Cold storage location has a profound impact on the overall supply chain cycle of any product. Since majority of cold storages are located near the point of production, it results in an inefficient supply chain thereby affecting product shelf life and overall quality.

6. ***Produce aggregation:*** The most important challenge for integrated cold chain supplies to various markets is the produce aggregation, either as raw material for processed food industry or for fresh supplies through cold chain, as most of the farm holdings are small. It requires a bigger role for aggregators and establishment of primary processing centers in the clusters of production for minimal processing to preserve the initial quality

7. ***High operating cost:*** Daily operations in the cold chain logistics industry require large amount of electricity. For most of the cold storage companies power cost hovers around 30% of revenue. Optimization of operating costs due to high energy costs is very challenging. In such a scenario high operating cost hinder the growth of the cold chain logistics market, especially when capacity utilization of warehouse goes down.

- **Cold Transportation:**

1. *Uneven Demand Distribution:* As mentioned previously in the report, majority of the cold storages are located near the point of production or at farm gate. These results in one-sided load i.e. the long haul vehicles that transport the products from the point of production center to distribution hubs don't find return load thereby making long haul transportation expensive and less profit making. This is one of the major impediments in the development of cold chain transportation across the country.

2. *Driver Problem:* Cold chain transportation heavily depends on finding drivers with the right skill set. Drivers are the main people involved for ensuring end-to-end smooth movement of products. Finding skilled drivers is also a major problem. Some Times, in order to save fuel Drivers switch off the cooling plant in the truck, which can adversely affect the products and degrade the overall quality of the product. To avoid such mal practices of drivers, now most of cold chain transportation companies are using IOT devices.

3. *Lack of Standards and Protocols:* There are various guidelines for handling various products which are not strictly enforced. Because the necessary technical standards are not followed, it results in lack of achieving optimum performance. Some products may even get damaged. Hence, proper training should be provided and the protocols to handle different products must be strictly followed.

4. *Seasonal demand and significant temperature swing between seasons:* Seasonal demand is a major hurdle in development of cold chain transportation infrastructure. Many commodities are in demand only during a particular time of the year. Hence, the companies will be forced to use transport vehicles for products that will result in under-utilization of the vehicle and will severely affect the bottom-line.

5. *Inefficiency of cost:* In secondary transport the cost of inefficiency is passed on to the customer but in case of primary transportation, the company itself bears the brunt.

6. *Vehicle Configuration standardization and optimization:* The transport vehicles bought by the companies for a different segment and may be used for another segment i.e. payload may decrease thereby affecting profits.

7. *Poor technology adoption due to fragmented ownership of vehicles:* Since there are no incentives for promotion of use of technology in reefer vehicles, many times owners don't use proper technology such as data loggers. This results in spoilage of the products thereby affecting the quality and shelf life of products.

8. *Financing Options:* While vehicle loans are available at low cost, in case of reefer vehicles, the chassis, The insulated body and refrigeration unit are subjected to different financing norms.

- **Emerging trends in cold chain Logistics:**

1. *Shift towards Multi-commodity facilities:* There is a shift in the industry from single commodity item storage to modern multi-purpose storage as investors realize that over-dependence on one item may result in losses. New facilities also include multiple

allied facilities like: ripening chamber etc.

2. *Use of technology:* **There is an increasing use of technology in cold chain i.e. from the use of data loggers to monitor the temperature to use of block chain, companies are increasingly leveraging technology to meet the rising customer expectations. Real time monitoring and remote temperature management are becoming basic requirement in cold chain logistics.**

3. *End to end service offering:* **The objective for integrated cold chain operations is to create effective, efficient, and reliable process because an end-to-end cold chain security is still the weak link in Indian distribution system. Single breakdown in cold logistics chain can lead to significant losses of products. Now a day's cold chain companies are providing real time access to temperature of cold chain chamber / in transit vehicles. Door opening, loading/ unloading time etc.**

4. *Integrated cargo complexes at major airports and seaports:* **Equipped to handle all kinds of goods, including all temperature segment and perishables**

COVID IMPACT ON COLD CHAIN

Year 2020 has seen a significant buzz in cold chain space dur to Covid. Vaccine immunization program will need strong logistics support, specially from the cold chain segment. In normal conditions India requires only 390 Mn doses of vaccines. While for COVID country will need 1.7 bn doses of vaccines and the immunization program of these doses will be spread over 18 months to 24 months. Which means there will be huge spike in demand of cold supply chain, but this boost is not expected to be perpetual. Requirement for this will be spread over a short span of time period, which will create capacity crunch in storage and transportation both.

More than 100 companies are in race of vaccine and out of this 4-5 players have clear lead in Indian market. Cold chain requirement for different vaccines are also different ranging from -70 degree to +8 degree centigrade. For a vaccine requiring temperature of -70 degree, available storage and transportation capacity in India is almost zero, while for any vaccine requiring temperature up-to -25 degree requisite infrastructure is available. For transportation usage of dry ice will enable and support the infrastructure, with which required temperature can be maintained for 1-2 days in designated boxes.

According to government data sources, India has more than 27,000 cold chain points, of which 750 are located at the district level and above while others are located below the district level. Considering the high Capex and short-lived requirement for cold storages for vaccine, no new large cold infrastructure is expected for this purpose. Instead, demand will be fulfilled through preexisting cold warehouses, which can easily handle 2-8 degrees Celsius or few additions of cold rooms at spoke distribution centers. As per the estimates 20-50 cold rooms per state will be required for storage. And such cold rooms can be easily. Improvement for last mile transportation and data visibility will be required to handle the vaccine supply chain.

GOVERNMENT INITIATIVES AND INCENTIVES FOR COLD STORAGE

The government recognizes the importance of the cold chain industry and, thereby, assigned it the status of infrastructure industry in FY12. Further, the government offered multiple incentives such as viability gap funding, tax sops, FDI, etc. to facilitate growth in the industry. The various incentives offered to the industry are mentioned below:

Infrastructure: The financial assistance is for setting up cold chain is granted by MOFPI (Ministry of Food processing Industry) as well as MIDH (Mission for integrated development of Horticulture).

MOFPI: The financial assistance for setting up cold chain is limited to maximum of 10 crore per project in relation to technical civil works and eligible plant and machinery.

INFRASTRUCTURE	GRANT-AID
Storage infrastructure including pack houses, pre cooling unit, ripening chamber and transport infrastructure	35% for general areas, 50% for north east, Himalayan state, ITDP Areas and Islands of the total cost
Value addition and process infrastructure including frozen storage, deep freezers associated and integral to processing	50% for general areas, 75% for north east, Himalayan state, ITDP Areas and Islands of the total cost
Irradiation facilities	50% for general areas, 75% for north east, Himalayan state, ITDP Areas and Islands of the total cost

MIDH: Assistance is available for setting up multi-chamber facilities having specific standards and guidelines as per the ministry. Cold storages upto 5000MT capacity are assisted under NHM/HMNEH scheme. For storages above 5000MT up to 10000 MT, assistance is provided under NHB scheme

Scheme Name	Infrastructure	Grant-aid
NHB	New cold storage/ modernization of cold storage for horticulture products	It is a open-ended credit linked scheme for 40% of capital cost of project, upto 30 lakhs per project for general areas and 50% of capital cost of project upto 37.50 lakhs per project for NE, Hilly and Scheduled Areas
NHM	New cold storage/ modernization of cold storage for horticulture products	This assistance is extended as a subsidy to credit linked project at 35% of capital cost of project in general areas and 50% in case of NE, Hilly, and Scheduled areas as per the guidelines of MIDH

APEDA: (Agriculture and Processed Food Products Export Development Authority Assistance)

Custom Duty: 5% basic concessional duty (BCD) for cold storage/room projects and industrial projects that include preservation, storage or processing of agriculture, apiary, horticulture, dairy poultry, aquatic and marine produce. Truck refrigeration and refrigeration motor vehicles have been fully exempted from BCD.

Excise Duty: Central excise duty has been fully exempted for installation of cold storage, cold room or refrigerated vehicle for the preservation, storage, transport and processing of agricultural, apiary, horticultural, dairy, poultry, aquatic and marine produce and meat air conditioning equipment and refrigeration panels for cold chain infrastructure, including conveyor belts used in cold storages, mandis, and warehouses.

Foreign Direct Investment (FDI): GOI has allowed 100% in cold chain sector. As a part of the policy, there has to be a minimum $100Mn investment with at least 50% of the investment in back-ended infrastructure. As per the extent of FDi policy this 100% FDI is permitted under automatic route.

Fiscal Incentives: SSection 80-IB of the Income Tax Act provides deductions with respect to cold chain. In the first five years, the concessions are at 100% and later on 25%/30% for the next five years.

- Under Section 35-AD of Income Tax Act 1961, deduction at 150% is permitted for expenditure incurred on capital investment in setting up cold chain facility.
- Cold chain projects are eligible for External Commercial Borrowings.
- Concessional rate of custom duty is at 5% on imported equipment for cold chain facility under project import benefits.
- Many activities relating to cold chain are included in the exempted and the negative list for service tax.

(Source: ISHRAE; MOFPI presentation on Government support and initiative to build robust cold chain)