

The cold chain market in india marketing essay

[Business](#), [Marketing](#)



Abstract:

The cold chain market in India, which is primarily dominated by the private sector, has got a boost from the government in the last two budgets.

Growing demand in retail and pharmaceutical sectors drives the cold chain market and it has huge potential to grow in the near future, especially since now it has strong government support. The cold chain market was valued at INR 89 Billion and is anticipated to grow at a CAGR (Constant Annual Growth Rate) of 28.7%. Government backing will help boost the capacity creation for cold storages while the new players are gradually venturing into the more profitable refrigerated transport services. The cold chain market in India is expected to grow at a CAGR (Constant Annual Growth Rate) of 28.7% in the next 5 years, which will make the market reach INR 660 Billion by 2017. The Indian cold chain market is highly fragmented in which about more than 3500 players are present. There are large numbers of small players present in the Indian cold chain industry; some of the well-known organized companies are Snowman, RK Foodland Pvt. Ltd, Fresh and Healthy Enterprises Limited. (FHEL), MJ Logistic Services Ltd. etc. It is expected that cold chain market in India will get more organized with the entry of large private players in this arena. The factors for growth of the industry mainly depends on the growth in organized retail, growth in processed food sector, demand from pharmaceutical sector, shift towards horticultural crops and changing consumption pattern. The key challenges of the market include lack of uneven distribution of cold chains, logistical support, cost structure and power supply. The key trends in the market have also been analyzed

which includes entry of foreign players, cold chains facilities at airports, rail based reefers and backward integration.

INTRODUCTION

Cold chain is now recognized as one of the fastest growing sector in India. It is true that in a country which ranks number one in milk production in the world, is number two in fruits & vegetables production and has substantial production of marine, meat & poultry products, the country needed a fully developed cold chain sector. However the present scenario reveals that there is a tremendous scope for the development of cold chain facilities. Cold stores form the heart of the cold chain. An overview of the cold storage industry in India indicates that the cold stores have been established initially right from the beginning of twentieth century but the further development was fairly slow. These units were mostly designed for storage of potato and were located in areas like UP, Bihar, West Bengal, and Punjab etc. It was only in Sixties that the idea of multi product, multi chamber cold stores was introduced with Maharashtra taking the lead. The cold storage sector is undergoing a major metamorphosis, with the Government focusing on food reservation. A lot of stress is being laid on energy efficiency as the cold stores are energy intensive. With the advent of newer materials / equipment's, every part of a cold chain renders itself amenable for improvement. As a result type of construction, insulation, refrigeration equipment, type of controls - all of them are going through major changes. India is an agricultural-based economy. More than 53 percent of India's land is cultivable, compared to the global average of around 11 percent. Each year, India produces 63. 6 million tons of fruits and 125. 79 million tons of

vegetables. India is also the largest producer of milk (105 million metric tons per year). India produces 6.5 million tons of meat and poultry, as well as 6.1 million tons of fish a year. The perishable products transaction volume is estimated to be around 230 million metric tons. Although India has the potential to become one of the world's major food suppliers, the country's inefficient cold chain network results in spoilage of almost 40 percent of its total agricultural production. The total value of the cold chain industry is estimated to be as high as INR 156 billion and growing at 28 per cent a year. The total value is expected to reach INR 660 billion by 2017 through modernization of existing facilities, increased investments, and establishment of new ventures via private and government partnerships. The Indian agricultural sector is going through a major shift from traditional farming to horticulture, meat and poultry and dairy products, all of which are perishables. The demand for fresh and processed fruits and vegetables is increasing as urban populations rise and consumption habits change. Due to this increase in demand, diversification and value addition are the key words in the Indian agriculture today. These changes along with the entry of an organized retail food sector spurred by changes to Foreign Direct Investment laws, are creating opportunities in the domestic food industry, which includes the cold chain sector. As a result of the Government of India's new focus on food preservation, the cold storage sector is undergoing a major change. The Government has introduced various incentives and policy changes in order to curtail production wastage and control inflation; increase public private participation and improve the country's rural infrastructure. India's greatest need is for an effective and economically viable cold chain solution that will

totally integrate the supply chains for all commodities from the production centers to the consumption centers, thereby reducing physical waste and loss of value of perishable commodities. For this reasons, the Government of India has prioritized the development of the cold chain industry. The government has shell out elaborate plans and incentives to support large scale investments essential for developing an effective and integrated cold chain infrastructure. One of the most critical constraints in the growth of the food processing industry in India is the lack of integrated cold chain facilities. According to the government's estimates India has 5, 450 cold storage facilities of which 4, 865 are in the private sector, 400 in the cooperative sector and 125 in the public sector. Although the combined capacity of the cold storage facilities is 23. 67 million metric tons, India can store less than 11% of what is produced. Most of the infrastructure used in the cold chain sector is outdated technology and is single commodity based. The India's controlled atmosphere storage facilities and other cold storage facilities with the technology for storing and handling different types of fruits and vegetables at different temperatures would have a very good potential market in India.

Industry Overview:

Industries which are directly related to cold chains sectors are fruits and vegetables, ice cream, processed meat and poultry, seafood, preventive medicines (mainly vaccines) and chemicals. The cold chain has a critical role to play in India as two-thirds of the country's population is dependent on agriculture for its livelihood. The Indian food market is estimated at over \$183 billions. India is the second largest producer of fruits and vegetables in

the world, with an annual vegetable produce of around 86 million tonnes and an annual fruit produce of around 45 million tonne. Of the close to 131 million tonnes of fruits and vegetables that the country produces, nearly 40 percent get wasted. India is the largest producer of milk in the world, producing around 100 million tonne, and accounting for nearly 17 percent of global production. About 36 percent of this milk is processed. More than 10 percent of annual milk production in the country is lost due to inadequate storage facilities. India has roughly 5,450 cold storages with a capacity of 24 million metric tonne, over 90 percent of which are suitable just for storing potatoes only. Inconsistent standards in different sections of the cold chain could lead to damage of food, either by shock or by undue temperature variations. This degrades food quality due to chemical reactions which are triggered off, which can otherwise be mitigated by low temperatures. To maintain integrity of food and pharmaceutical products, these providers dependent on efficient and fully integrated end-to-end cold supply chain technology. Thus cold chain companies should design a supply chain solution which maintains the required temperature according to the physical attributes of the product.

The cold chain consists of two logistic systems:

Surface storage: Refrigerated warehouses for storage of temperature sensitive products. Refrigerated Transportation: Reefer trucks, containers, ships and trains for transport of temperature sensitive products. A cold chain logistics player could either be a cold storage owner or the owner of a fleet of reefer trucks. Also, there are 3PL (Third Party Logistics) firms which own the entire network, right from procurement to the final destination of the

temperature sensitive products. Thus, the success of cold chain companies depends on how efficiently they can transport temperature sensitive products from the place of origin to place of destination with full integrity. Different products require different temperatures. The common standard temperatures are Chiller (-20°C), Frozen (-18°C) and Deep Frozen (-25°C). The system for guaranteeing vaccines quality is generally referred as " cold chain". Cold chain management has two categories: managing equipment and managing people. Evaluations of existing means revealed that some countries needed to improve their systems vaccines management. Although there were many positive aspects to the functioning of the cold chain, the following weaknesses were observed:

- Frequent breakdowns in cold chain (sometimes for a long time) because of the lack of fuel, spare parts and back-up energy source;
- Incorrect use of the Vaccines Vial Monitor (VVM) as a management tool; and
- Lack of planning for maintenance and cold chain rehabilitation;
- Lack of planning for emergencies resulting in organization's not having effective cold chain systems during responses. These problems slow down improvement in routine vaccination services and hinder efforts to eliminate and eradicate disease. To solve these problems, it is necessary to:

- Identify problems in the cold chain and their causes;
- Strengthen management systems to prevent recurrence of the same or similar problems.
- Undertake specific actions to remove these causes; and

Active Cold Chain (Materials for producing cold)

These include active thermal systems that do not use any phase change materials such as water/ice or dry ice. These systems use mechanical or electric systems powered by an energy source, combined by thermostatic

control to maintain the proper temperatures of the product. The equipment used in active cold chain are split into two categories which are as follows: ❏ Absorption refrigerators/freezers. ❏ Compression refrigerators/freezers;

Absorption models

The energy sources are: kerosene, gas, electricity (heating resistor). They use more energy and require more maintenance. They produce less cold and are slower. However, they are suitable for situations where electricity is not available or reliable. Since the cooling circuit is closed, it is not possible to fill it with gas or repair it if there is a leak. However, these models are very reliable. Models used to store vaccines are particularly well insulated and equipped with a temperature stabilizing device, except for the kerosene model which does not have a thermostat (the best known manufacturers are Sibir and Electrolux). They are used extensively for the Extended Vaccinations Programs (EVP). Domestic absorption models are generally insulated less well and it is occasionally difficult to maintain a low temperature for storing vaccines, particularly when the external temperature is high (higher than 32°C). The efficiency of the models that run on oil depends on the quality of the fuel. Decanting and filtering are often required. A kit is available to modify certain burners, in order to improve operating efficiency, despite oil of inferior quality.

Compression Equipment

These are the models most commonly used. They run solely on electricity (220V / 110V or on a battery). These models use little energy, require little

maintenance, produce significant amounts of cold quickly and are easy to repair. They are equipped with a thermostat for setting the desired temperature. Some models require only eight hours of energy per day ("ice lined refrigerators"). Solar models are of the compression type (source of energy: solar panels, battery). They are expensive and maintaining them requires specialized knowledge. These models may only be equipped with an HFC 134a coolant which is not harmful for the environment (the ozone layer). This is valid only for compression models since absorption models function with a water/ammonia/helium (or hydrogen) mixture.

Passive Cold Chain (Shipping/storage materials)

These include passive thermal systems that commonly use phase change materials (PCM) such as water/ice or dry ice. These shipping systems are the most basic and cost effective. Some of the basic systems in use are as follows:

- Freezers for province, county and sometimes at the township level;
- Refrigerators and, in some areas, the new water-jacket refrigerators for province, county and township levels. Some villages do not have access to a refrigerator for vaccine storage and therefore use:
- Cold/cool Boxes at all levels for transporting vaccines;
- Isothermal packaging/control materials like paper to wrap the vaccines up when using a vaccine carrier;
- Vaccine carriers to store vaccines during the immunization session or round;
- A thermometer to measure the temperature inside the vaccine refrigerator and cold boxes; and
- A chart to record the day and time of the temperature of the vaccine refrigerator. The chart should be used to record the temperature two times a day (morning and night).
- Ice packs or ice, as a last resort, to keep the vaccines at a temperature between +2°C and 8°C;

Vaccine management

Anyone handling vaccines is responsible for their state of quality, at each step in transport, storage and administration of vaccines. Vaccines are delicate biological substances that can become less effective or destroyed if they are:

- ❑ Frozen
- ❑ Exposed to direct sunlight or fluorescent light
- ❑ Allowed to get too hot

Vaccines should be maintained within the recommended temperature range of 35°F (2°C) to 45°F (8°C). The loss of vaccine effectiveness is cumulative and cannot be reversed.

Equipment for Transporting and Storing Vaccines:

The essential cold chain equipment needed to transport and store vaccines within a consistent safe temperature range include:

- ❑ A refrigerator for storing vaccines
- ❑ Ice packs to keep vaccines cool
- ❑ Material to separate ice packs from the vaccines when using cold boxes (e. g. shredded paper, cardboard, bubble wrap or Styrofoam)
- ❑ Cold boxes for transporting and storing vaccines
- ❑ A digital, electronic or mercury/maximum thermometer and chart for recording daily temperature reading

Maintaining and Monitoring Refrigerator Temperatures

The thermometer needs to measure the refrigerator temperature close to the vaccine vials. Choosing a thermometer to monitor the vaccine refrigerator. Digital-type thermometers or mercury minimum-maximum thermometers are the reliable and easier to read.

Market Overview

The total value of India's cold chain industry is currently estimated at INR 156 billion and reportedly growing at an annual rate of 28 per cent. The total

value for the industry is expected to reach at INR 660 billion by 2017 through modernization of existing facilities, increased investments, and establishment of new ventures via private and government partnerships. India's cold chain industry is still evolving, not well organized and operating below capacity. Most equipment in use is outdated and single commodity based. According to government estimates, India has 5, 450 cold storage facilities, with a combined capacity of 23. 67 million metric tons that can store less than 11% of what is produced. The majority of cold storage facilities are utilized for a single commodity, such as potatoes. Most of these facilities are located in the states of Uttar Pradesh, Punjab, Maharashtra, Uttaranchal, and West Bengal. In addition, India has about 250 reefer transport operators (this includes independent firms) that transport perishable products. Of the estimated 25, 000 vehicles in use, 80% transport dairy products (wet milk); only 5, 000 refrigerated transport vehicles are available for all other commodities. India's greatest need is for an effective and economically viable cold chain solution that will totally integrate the supply chains for all commodities from the production centers to the consumption centers, thereby reducing physical waste and loss of value of perishable commodities. For this reason, the Government of India has prioritized the development of the cold chain industry. The government has shell out elaborate plans and incentives to support large scale investments essential for developing an effective and integrated cold chain infrastructure. India's food industry, which is currently estimated to be at approximately INR 5300 billion, will grow to USD 16500 billion by 2017. According to a survey conducted by Corporate Catalyst India, another leading consulting firm, "

Value addition of food products is expected to increase from 8 percent to 35 percent and that of fruits and vegetable processing from the current 2 percent to 25 percent by the end of 2025". The survey further reports that the dairy sector, which currently comprises the highest share of the processed food market, will experience marked growth. One of the most critical constraints in the growth of the food processing industry in India is the lack of integrated cold chain facilities. According to the government's estimates India has 5, 450 cold storage facilities of which 4, 865 are in the private sector, 400 in the cooperative sector and 125 in the public sector. Although the combined capacity of the cold storage facilities is 23. 67 million metric tons, India can store less than 11% of what is produced. Most of the infrastructure used in the cold chain sector is outdated technology and is single commodity based. Many are designed for storing potatoes. Industry experts believe that controlled atmosphere storage facilities and other cold storage facilities with the technology for storing and handling different types of fruits and vegetables at different temperatures would have a very good potential market in India. Another major constraint is the lack of refrigerated vehicles for movement of perishables produce (with the exception of milk). According to industry estimates, approximately 104 million metric tons of perishable produce is transported between cities each year. Of this figure, about 100 million metric tons moves via non-reefer mode and only four million metric tons is transported by reefer. Although there are currently more than 25, 000 vehicles and 250 operators involved in refrigerated transport, 80% of this capacity is dedicated to transporting milk. When compared with world standards for cargo movement through cold chain,

India is still far behind. The percentage of movement of fruits and vegetables through cold chain in U. S. is around 80 to 85 percent, Thailand is 30 to 40 percent and India is negligible. Currently, most of the refrigerated transport in India is operated by small, non-integrated firms that do not make use of state-of-the-art technology or management practices. Therefore, India offers market potential for cold chain logistic solution providers, including refrigerated transport services. The Government of India now recognizes that development of cold chain is an essential next step in upgrading India's food processing industry. In the 2011-2012 national budget, the Indian government announced a series of measures to reduce the production and supply chain bottlenecks in the agricultural sector in order to facilitate modernization, ease importation of foreign equipment, and attract foreign investment in India. Some of these measures are listed below:

- Accorded infrastructure status to post-harvest storage, including cold chain;
- Raised the corpus of Rural Infrastructure Development Fund XVII to \$ 4 billion in FY 12 from \$3.5 billion in FY 11 and the additional allocation would be dedicated to the creation of warehousing facilities;
- Air-conditioning equipment and refrigeration panels for setting up cold chain facilities would be exempted from excise duty beginning in the next fiscal year. Conveyor belts for equipment used in cold storage, wholesale markets and warehouses would be also exempted from excise duty;
- The Viability Gap Funding Scheme is extended for public private partnership projects to set up modern storage capacity;
- The National Horticulture Mission has sanctioned 24 cold storage projects with a capacity of 140,000 metric tons;
- Creation of an additional 15 million tons capacity of storage capacity through public private

partnerships put on a fast track;• An additional 107 cold storage projects with a combined capacity of over 500, 000 metric tons have been approved by the National Horticulture Board;• A package of measures to improve the availability of storage and warehouse facilities for agricultural produce and to incentivize food processing;• Promised full exemption from service tax for the initial set up and expansion of cold storage, cold room (including farm pre-coolers for preservation or storage of agriculture and related sectors produce) and processing units. In addition, full exemptions from customs duty for the manufacture of refrigerated vans or trucks have also been promised;• Announcement to set up 15 more mega food parks in the country;• A National Food Security Bill will be introduced in the Parliament later this year;• States asked to reform the Agriculture Produce Marketing Act urgently to improve the supply chain;• Credit flow in agriculture raised from USD 84 billion to USD 107 billion ensuring that resources do not constrain growth in the sector

Drivers & Challenges:

Drivers:

These include growth in organized retail, processed food sector, FDI in retail segment, Government initiatives, and shift towards horticultural crops and demand from pharmaceutical sector. Large retail players are providing infrastructure that ensures preservation of produce over a long period of time. Relaxation in FDI in retail sectors enhances more players to come. Government of India has been cognizant of the need to nurture the cold chain industry and introduced several incentives to achieve the aim. Some are infrastructure status to the cold chain, concessional import duty to setup

cold chain, tax benefits for companies investing in cold chain etc. Some of major drivers in cold chain industry are: 1. India Food Processing Market 2. Horticulture Sector 3. Organized Retail 4. Pharmaceutical Industry 5.

Government Initiatives

1. India Food Processing Market

India ranks first, globally, in the production of milk and pulses and second in the production of tea, fruits and vegetables. Despite being a major food producer, India's share in world food trade is less than 2 per cent. At present, just 6% of the food-items produced in the country India are processed in contrast to the developed nations where 60% to 80% of the food items are processed. While the sector grew at an impressive 14.7% in 2008-09 despite the global slowdown, the country's highest authority, the Prime Minister, expects the National Food Processing Policy to the necessary boost to the sector. In India, most foods are consumed in the fresh form and a small quantity is processed for value addition. In recent years, however, the market for branded processed food products has expanded. As per a study conducted by McKinsey and the Confederation of Indian Industry, the total food market turnover is over Rs. 2,500 billion (US\$ 69.4 billion). Of this, value added food market comprises Rs. 800 billion (US\$ 22.2 billion).

Growing at about 14%, the processed food industry has started attracting increased investment to cater to both, the domestic and export demand. The food processing industry contributes around 10% to India's manufacturing GDP and 13% of the country's export. Food processing involves any type of value addition to the agricultural produce starting, the post-harvest level.

The processed food industry provides safe convenience foods to consumers,

and promotes diversification and commercialization of agriculture by providing effective linkages between the farmer and consumers in both domestic as well as international markets. The extent of processing can be categorised as follows:

- ☛ Primary Processing: Processing: cleaning, grading, powdering and refining of agricultural produce, e. g., grinding wheat into flour.
- ☛ Secondary Processing: basic value addition, e. g., tomato-puree, ground coffee, cleaning and processing of meat products.
- ☛ Tertiary Processing: Processing: high value addition products like jams, sauces, biscuits and other bakery products that is ready for consumption at the point of sale.

The industry employs over 16 million workers directly and has a wide scope covering activities such as agriculture, horticulture, plantation, animal husbandry and fisheries. It also includes other industries that use agriculture inputs for manufacturing of edible products. The Ministry of Food Processing, Government of India (GOI), classifies the following under processed food industry:

- ☛ Dairy, fruits and vegetables
- ☛ Grains
- ☛ Meat and poultry
- ☛ Fisheries
- ☛ Consumer foods including packaged foods, beverages and packaged drinking water

India with a population of 1.16 billion (growing at about 1.7% per annum) provides a large and growing market for food products. India is amongst the three largest producers of agricultural commodities in the world. In addition, food is the single largest component of private consumption expenditure, accounting for about 37.8% of the total spending. The land under major crops including horticulture is about 362 million hectares. India produces 101 million tonnes of milk, annually, 185 million tonnes of fruits and vegetables, more than 485 million livestock, 187

million tonnes food grain, 6.9 million tonnes of fish, over 489 million poultry and 50,700 million eggs.

2. Horticulture Sector

The country's demand for horticulture products is expected to grow by over 20 per cent to touch 360 million tones in 2020-21. A study done by 'The Horticulture Society of India' revealed that rising income will create more demand for horticultural products, which will further push the production of such crops in India. As the income level would grow, the demand for products such as fruits, edible oils and other products will pick up and will provide good incentive for growing them. The horticulture sector encompasses a wide range of commodities, including fruits, vegetables, potatoes, tuber crops, and ornamentals, medicinal and aromatic crops. While, the new problems are emerging, the sector has grown tremendously in terms of increase in area, total production and introduction of new crops. However, there is a gap in terms of skilled persons required and available for the sector. Keeping this in mind Horticulture Society of India and National Skills Foundation of India have come together to organize the 4th Indian Horticulture Congress. Some of the major themes, which would be discussed, include climate change, biodiversity management, innovations in hi-tech horticulture, mechanization and post-harvest management.

3. Organized Retail

Compared to power sector reforms, an infrastructure push or restructuring labor laws, the change in rules to allow 51% FDI in multi-brand retail may seem a relatively minor economic policy measure. However, the debate

surrounding the retail decision - the government notified the new FDI rules on September 20 - is telling. It has regurgitated many of the shibboleths of Indian economic orthodoxy. The fear of the foreigner; the disinclination to permit a modern market economy in Indian agriculture; the obsession with small-scale enterprise; and the dogged refusal to recognize the benefits of an economy of scale: all of these have been apparent in the past few days. It is crucial to interrogate these concerns and ask what the arrival of international retail chains can mean for India's farmers as well as consumers and for the economy generally. As it is well known that some 33% of fruit and vegetables in India is wasted and perishes in the journey from the farm to the fridge. The comparative figure for Australia, which has the world's best record in this area, is less than 1%. There is a logistics experience here that India needs to tap. India has only 5, 300 cold storages, a figure that sits uneasily when placed against the 12 million small and medium retail outlets in the country. It can be argued building cold storages is not rocket science and can be done by domestic companies and businesses as well. Well, to be fair local companies can also make cars - and there is no real need for a Suzuki or a Nissan to be here. Where these MNCs score is not just in the technology available to them - which can be sourced, to be fair - but in their distribution and marketing muscle, which will take years and decades to replicate. Why is this distribution and marketing muscle - which translates to deep supply chains in the case of giant retail companies - important? It is necessary if the Indian farmer is to get a better deal and ultimately become part of the global economy, and not remain a marginal economic actor confined to his district. Today, an Indian farmer gets only a third of what the

end-consumer pays for his produce. In times of bumper harvests and distress selling, he gets just a sixth. The windfall gains are for a series of intermediaries. Organized retail provides the farmer greater security. As a 2008 ICRIER study of the impact of organized (but Indian-owned) retail found, " Average price realization for cauliflower farmers selling directly to organized retail is about 25% higher than their proceeds from sale to [the] regulated government mandi". Bharti Walmart's direct purchase from farmers in Punjab is also believed to have augmented incomes by 7 to 10%. Admittedly, there is the other side of the story. Again, take an Australian example. Woolworths and Coles are the two biggest retail chains down under. Together, they sell 60% of the wine consumed by Australians. Essentially, this means they determine the price and type of wine that producers will find useful to bring to the market. Admittedly, this has wine farmers complaining. The stranglehold of big retail will ensure farmers cannot dictate prices and tastes. However, the certainty of purchase by the big retail chains also protects farmers (and consumers) from shocks. In the end, when they build their long-term relationships with farmers and set up a network of warehouses and cold chains, international retail companies will begin to look beyond selling supply lines. India's comparative advantage in the world economic system is cheap labor. These results in Indian car manufacturers making vehicles at a cost lower than that in, say, Detroit or Turin. India's IT-enabled services industry has benefited from a similar principle. Retail chains will have to work with agricultural scientists and farming communities and determine the type and quality of produce that will be appropriate for their markets. There will be a process of mutual learning.

In Gujarat the sourcing of certain types of potatoes by McCain Foods, using contract-farming arrangements is an indicator of opportunities. Multi-brand retail is not only about the agriculturist. Equally, it is about the consumer. Forty per cent of India's GDP is made up of household consumption. An informal, empirical assessment made by this writer suggests cheap, everyday stainless steel cutlery, imported from Vietnam or China, is three times more expensive in Indian-owned retail chains than at multinational retail stores in the United States and Australia. Of course, it would be wonderful if this cutlery was made in India, but the Indian consumer cannot determine the regulatory changes needed to make India a manufacturing power. Neither can he be blamed for looking forward to exploiting the economies of scale that international retail chains will bring to him.

4. Pharmaceutical Industry

Cold chain for pharmaceuticals needs to be temperature controlled as the shelf life of the products needs to be maintained. A well-organized cold chain system has the capability of reducing the deterioration of drugs as well as retaining the quality of the product. Today, the Indian pharmaceutical industry is valued at \$ 22 billion with experts projecting the market to grow at a Compounded Annual Growth Rate (CAGR) of eight per cent during 2010-14. Indian pharma exports are poised to grow at 30-35 per cent during 2011-2012 and are projected to touch \$ 15. 8 billion in 2013-14, according to the Indian Drug Manufacturers' Association (IDMA). With this, the exports have also grown. Hence, the cold chain segment is of critical importance as the pharmaceutical compounds being exported have the likelihood of getting damaged with excessive heat or freezing during shipment, resulting in

reduced efficiency. Although common temperature range for a cold chain in pharmaceutical industries varies from 2-8 °C, when it comes to specific temperature tolerances the levels largely depend on the actual product being shipped. According to the GMP guidelines all processes that might impact the safety, efficacy or quality of the drug must be validated, including storage and distribution of the drug substance. Hence, the need for a well-established cold chain distribution process, especially for pharma products. Today, a number of countries import vaccines along with other forms of drugs from India. The process of shipping drugs from one place to another requires careful consideration, design, validation, and supervision at all levels considering various factors such as the type of shipping containers to be used, the distribution carriers to be contracted, what humidity control equipment is required (if any), the types of environmental conditions that the drug is expected to maintain, the length and time of the distribution route and more. Due to the above listed factors, the packaging must be capable of maintaining product temperature even in case of fluctuating weather. In spite of the advancements, there are a few factors that are creating a hindrance in the development of the cold chain sector in pharma. One of the biggest hurdles is that of cost. The reason why a number of companies do not opt for sophisticated cold chain systems is due to its high cost. However, it is important that people evaluate this situation critically. If a company does not follow the desired cold chain system while transporting a drug, it is likely that a few of the drugs would get damaged. As the damaged drugs are returned by the customer, the company definitely experiences a situation of loss. But, if a company invests 20-30 per cent more than the usual in a state-

of-the-art cold chain system the probability of a damage in the drugs are bleak, which would in turn benefit the pharma company. Advancement with regard to packaging and technology is another quandary faced today. Although over the years, the state of technology in cold chain has improved, the growth is very slow and negligible. The Indian logistics companies need to indulge in more innovation and invent better technology and packaging solutions keeping in mind the requirements of the Indian pharma companies. Today a number of pharmaceutical companies export their products to countries across the globe. For them to flourish further and create goodwill for themselves it is important that the quality and effectiveness of the drug be maintained, which can only happen with the support of a strong cold chain system. The cold chain pharma sector in India is at an extremely nascent stage today and has a long way to go in terms of getting sophisticated solutions in the market as well as getting the companies to understand what their requirements are and how they can meet them.

5. Government Initiatives

The government of India has taken various initiatives for better food management which are also encouraging factors for the Indian cold chain industry. The government of India has decided to open various mega food parks which will require both; temperature controlled vehicles as well as temperature controlled warehouses. By allowing the 100% FDI in the cold chain industry, government has shown their high interest towards cold chain industry. The National Centre for Cold-chain Development (NCCD) is an autonomous body established by the Government of India with an agenda to positively impact and promotes the development of the cold-chain sector in

the country. NCCD was registered under the Society Registration Act, 1860 in 2011 and obtained sanction by the Union Cabinet of India on 9th February 2012 in a session chaired by the country's Prime Minister. Globally, about 60% of fresh foods are transported in the cold chain helping restrict loss in value and extending reach to distant markets. In India, less than 5% of such cold-chain shipment takes place with most of the fresh produce being subject to harsh climatic conditions. This results in their gross loss of food items. Similar lack of cold-chain in the pharmaceutical sector witnesses increased risk and loss of medical products. NCCD is intended to address all segments and the developmental aspects of cold-chain. India is one of the largest producers of agricultural products and one of the global leaders in the pharmaceutical sector. Yet, it is known to have a fledgling cold-chain, which results in supply chain losses of food and other resources. These losses have been stated to be as high as USD 8 to 15 billion per annum from the agriculture sector alone. To address this concern, the government had earlier constituted a National Task Force on Cold-chain in 2008. This task force was discharged in 2010 on completing its mandate and in its report recommended that a dedicated institute be established to promote and coordinate various cold-chain initiatives undertaken by different government arms and the private industry. Cold chains are common in the food and pharmaceutical industries and also some chemical shipments. The Government of India is one of the driving forces in developing the cold-chain industry and supports private participation through various subsidy schemes and grants. Investment in cold-chain in India was also opened under the automatic route for 100% FDI participation. The existing cold-chain in India

largely comprised (in 2010) of comparatively small private companies with a regional or local footprint. Most of the earlier infrastructure developed to service the cold-chain needs of the country was focused on the storage of potato. While this produce is not native to India and is harvested only once only during winter, the success of cold-chain intervention has made potatoes available all through the year and is considered part of the country's staple diet.

Challenges in the Sector:

Cold chains face several roadblocks in their growth and some of the most challenging hurdles are listed below:

- **Lack of Proper Infrastructure:** The cold chain industry in India is very fragmented, with players not having the strength to invest in the technology needed to build high quality cold storage or to invest in reefer trucks.
- **Uneven Distribution of Capacity:** The majority of cold storages in India have been established in states like Uttar Pradesh, Maharashtra, Gujarat, Uttarakhand, Punjab and West Bengal. But the establishment of such cold storages needs to be more geographically diverse.
- **Rising Real Estate Cost:** A fully integrated cold storage facility of international standards, with one million cubic ft. of storage space, will require an area of approximately an acre, which is a huge investment.
- **High Energy Cost:** Energy expenses alone account for about 30 percent of the total expenses of the cold chain sector in India. This is the main constraint about setting up cold chains in India. India's peak power deficit is around 17-18 percent. Thus the investment in back-up systems increases capital investment costs.
- **Location for Cold Storage:** Cooling units are not mobile units, so the location of such units becomes a key constraint as there are

very few parcels of large land spaces available in India. • The cold storages present in India can cater to single commodities only. Different commodities require different temperature conditions, resulting in poor capacity utilization and low financial viability.

Role of Cold Chain Service Providers

With the demand for better quality food at affordable prices by consumers, companies rely on cold chain service providers to fulfill it. The service providers should be able to develop systems and processes to mitigate risk associated with temperature abuse in cold chains and thus help in business growth. The service provider should understand the importance of capacity utilization, productivity, inventory, cost, waste, error and theft (WET) management, along with the ability to track and trace these parameters. This will help to reduce total system costs which in turn will improve the bottom line. The success of implementing cold chain solutions to serve the consumers involves proper network optimization of warehouses, facility planning, the monitoring of product quality throughout the cold chain and having a corrective action plan to counter any gaps. Further, the higher cost associated with operating cold chains needs excellent operational efficiencies and continuous improvements to maximize profits for service providers. Other major challenges which make cold chains more complex are poor road connectivity, inadequate logistics infrastructure, inadequate IT systems and inefficient transport providers.

Product Handling

To move temperature sensitive goods with full product integrity, supply chain solution providers should have well-established processes from pre-shipment preparation to final verification and delivery to destination. Product handling is an inherent and important aspect which needs great attention. The maintenance of a cold chain is the best way to maintain the quality of a product and minimize all forms of deterioration after harvesting, including weight loss which results in wilting and limpness, softening, bruising, unwanted ripening, colour changes, texture degradation and the growth of fungus as well as the decay of products. The export of fresh produce often involves long transit time and frequent handling. This makes effective cold chain management more difficult and even more essential, to ensure that the product finally consumed retains maximum freshness.

Importance of Efficient Cold Chains

- Increasing government regulation.
- The demand from customers for continuously available high quality food products are primary drivers of cold chain integration.
- Cold chain systems can be of strategic importance to companies since brand integrity, customer confidence, market share and profit are all at risk.
- Today's busy and health conscious consumer is demanding fresh, wholesome and healthy products in increasing volumes and a variety of offerings.

Improving the Cold Chain

- The Budget 2011-2012 provided infrastructure status to the cold chain sector.
- The Budget exempted air-conditioning equipment and refrigeration

panels used in cold chain infrastructure as well as conveyer belts from excise duty. • The Budget 2010-2011 included duty-free import of refrigeration units, which is required to make refrigerated vans or trucks. It also exempted trailers and semi-trailers used in agriculture from excise duty. • The Budget 2010-2011 proposed a concessional import duty of five percent with full exemption from service tax to set up and expand cold chains to preserve farm products as well as milk, meat and poultry products. • The government of India introduced tax benefits for companies investing in cold chain facilities as part of the budget 2009-2010. • The government of India has also revised its scheme of food parks in the tenth Five Year Plan and changed to the Mega Food Park Scheme (MFPS) under the 11th Five Year Plan • The involvement of railways and airports for transportation of cold chain products. • Investment from private equity funds in various cold chain projects. • The government of India has taken a decision to set up the National Centre for Cold Chain Development (NCCD) to address the issue relating to gaps in cold chain infrastructure in India. Maintaining and enhancing efficiencies in the cold supply chain is very important. The best way to do this is by reducing touch points in the supply chain. By following these practices rigorously and with passion, one can reduce the cost of the cold chain as well as improve cold chain processes. With average capacity utilization in the cold chain sector between 30 to 75 percent, the profits of a cold storage facility depend mainly on investment in technology, infrastructure and service standards. The most important factors that will decide the growth of the cold chain sector is the flow of funds in this sector. The investment can be from large business houses. Also, the government

can help in acquisition of land to set up cold chain storage facilities. The government must also speed up the introduction of GST, which will help in the development of centrally located warehouses.

Key Trends:

Cold chain is one of the fastest growing industry in India and very rapidly moving into organized manner. Some of the key trends in cold chain industry in India are described below.

• Rail Based Reefers, organized distribution.

A key business area with high potential for growth is the provision of Cold Chains. This involves providing transportation to perishable products from source to end-user, while maintaining a certain temperature along the route. Today 85% of the cold storages are in the private sector and not a single complete cold chain solution provider is available in the market. Absence of Reefer container linkages and high and increasing power costs are proving to be major impediments.

• Cold Chain Facilities at airports for exports.

The facilities for cold chain industry at the major airports are improving very fast in India. Drugs are complex entities and many of those are temperature sensitive in nature. This entails them requiring precise and continuous temperature conditions in transit in order to retain their potency and resultant efficacy. Lifesaving drugs and products like vaccines are very sensitive to proper cold chain. Any slippage in cold chain can lead to immediate denaturing or deterioration in quality of the product. It is imperative that a careful consideration is given by the authorities while

providing storage space at the airport warehouses before drugs find their way into the distribution channels run and controlled by the Drug companies. With a view to take the initiative to improve the Cold Chain Management at Mumbai and New Delhi airports, OPPI has taken up this cause with major stakeholders, particularly, Mumbai International Airport Pvt. Ltd. (MIAL) and Delhi International Airports Ltd. (DIAL), where 80-90% of the export & import trade of pharmaceuticals take place. OPPI delegation met with the Senior Officials of GVK in Mumbai and GMR in Delhi, who are the custodians of the respective airports.

• Cold Chains based on Public Private Partnership (PPP) model and entry of foreign players.

The government has taken a decision to set up the NCCD (National Centre for Cold Chain Development) on PPP (public-private partnership) mode for which the NHB has been declared as the nodal organization. This center will soon be in operation. This is an important advancement as it is realized that a joint role by the industry and the state is crucial for development of the industry. Bringing in the private sector - both as a competitor and as a complementary to the public sector would add greater strength and value for money - thus, the two working together would benefit both, the farmers and the consumers. In recent years India had gone through a Green Revolution and a White revolution (both synonymous for its success in agriculture and Dairy sector). India is ranked globally in the top 2 for horticultural products and accounts for 17% of global milk production, the largest in the world. Yet the country is still not able to export enough of its surplus and as much as 40% of fresh produce is wasted, mainly due to lack of satisfactory handling

in the supply chain. The consumer food retail sector is the fastest growing in the country, worth around 15 billion USD. Food outlets such as McDonalds and Dominoes have announced plans to double the number of outlets in the coming years. They too may find constraints due to lack of efficient supply chains to service their expansion. At the moment 900 million tons of cargo is handled in Indian ports and the country has plans afoot to double this capacity in the next ten years, yet there is not a single dedicated perishables gateway or fast track corridor for perishable cargoes in the country. The country's containerization is said to be only 20% and the country is adding to its existing 174 inland container handling depots to build up greater container handling capacity. It is also the largest exporter of beef in the world, shipping 1.5 million tons mostly through reefer containers.

• **Backward Integration, forward economy.**

Snowman and Kausar, two major names in the cold chain Industry have been bought over. Gatica, a logistics company in Hyderabad acquired Kausar India, Gateway Distiparks, the Transportation & logistics major acquired a controlling stake in Snowman Frozen Foods. The Future Group has carried backward integration, from food retailing to storage and transportation; with the launch of Future Logistics. Ahmadabad based Adani Group revamped its cold chain logistics facilities recently. Major players like Bharti, ITC, Reliance, Aditya Birla Group, Bharti the Godrejs, the Tatas and the Future Group has announced billion dollar investments which offer a ready market for third-party cold chain logistics players. Apart from the Global giants and the Indian corporate the airport infrastructure companies and the railways are also

planning to build refrigerated warehouses and perishable products cargo centers across the country in capture the share in the booming retail sector.

Competition

There are only few private players are present at national level in the India which dominate the industry though there are many state owned companies are present. The Surface Storage comprising of both organized and unorganized players like RK Foodland, Fresh and Healthy enterprise limited etc. The Refrigerated transport comprises of players like Snowman, Gati Kausar etc. There are atleast 50 companies are offering refrigerated transport services in India. Apart from that there are many captive establishments and new entrants are present. Some major Players in cold chain industry in India are Snowman MJ Logistics Services Limited Radhakrishna Foodland Private Limited Fresh and Healthy Enterprise Limited (FHEL) Gati Kausar

Players

Key customers

Location

Business Operations

Snowman HLL, Amalgam, GCMF, Mother Dairy, Baskin Robins, Mars, etc Bangalore Leader in Cold chain industry in India, Offers storage and integrated logistics services. MJ Logistics Colgate Palmolive, ITC, RFCL Limited. Delhi Provides Refrigerated transports services and cold management services Radha Krishna Foodland McDonald's, Dominos, Pizza hut, hotels & restaurants Thane, Mumbai Customized distribution & logistics

services encompassing entire supply chain, such as storage, handling and distributions
Fresh and Healthy Enterprise Limited (FHEL) Many small companies for transportation of Fruits and Vegetables. Delhi A Wholly Owned Subsidiary of Container Corporation of India. Provide complete cold chain logistics solutions Gati Kausar Cadbury's, Dominos, Nestle, Dabur Delhi Specializes in refrigerated transport solutions to its customers

Scope and Opportunities in Cold chain in India

The Indian cold chain market is highly fragmented where more than 3500 players are present. Currently the supply chain in India is extremely complex, it presents great market opportunities for those working in the temperature controlled supply chain. The cold chain market in India is anticipated to grow at a CAGR (Constant Annual Growth Rate) of 28.7% during 2012-2017, which will make the market reach INR 660 Billion by 2017. The demand for cold chain logistics from pharmaceutical industry and organized retail has been growing constantly. The predicted growth in the Indian vaccine market indicates a lot of opportunities for those involved in the cold chain, from the manufacturer to logistics service provider, the technology provider to trace & track and related software provider. Currently the market value of temperature controlled vehicles which are deployed for the transportation of pharmaceutical products is more than INR 210 Million, which is likely to reach at around USD 940 Million in next five years." Under the 12th Five Year Plan (2012-2017), The Department of Pharmaceutical has asked for the assistance of around INR 50 Crores for setting up the cold chain facilities across India. The market value of vaccine market in India is around USD 180 Million, which is growing at a very healthy pace of around

25%-30% annually. Vaccines require the support of temperature controlled environment right from the point of their initial stage of production to their final distribution. This indicates the unexplored potential for both the domestic as well as the international players which are present in the cold chain management system. Over the past few years, the Indian cold chain industry has going through some positive changes, Over the few years, Private sector participation has increased in the cold chain industry to cater to the increasing demand for cold chain logistics. It is expected that many large domestic and foreign companies will join the league in coming years to cater the growing demand of cold chain logistics. This will inject the required investment and latest technology in the Indian cold chain industry in near future. Cold chain industry of India is also expected to witness some major mergers and acquisitions by the big companies to establish their base and to expand their reach. The pharmaceutical distribution system in India is undergoing through a major shift and will continue to see major improvements, through compliance with the latest standards and the implementation of the latest technologies for supply chain management. Government initiatives, pharmaceutical industry, growing organized retail, food processing and horticultural produce would spur the demand for cold chain logistics in the coming years. Majority of the cold chain infrastructure in India was developed in 1960s which majorly supports the storage of potatoes and potato seeds. Nearly 75% of the total capacity of cold storages is suitable only for potatoes. Cold chain Infrastructure for other temperature sensitive goods is at extremely bad state right now. On an average, about 30-40% of horticultural produce gets wasted annually in India. Even though

India is the second largest producer of vegetables worldwide but its share in global export of vegetables is around 1.3% only. This is mainly due to the lack of cold chain infrastructure which includes both storage and transportation facilities. According to recently published report by TechSci Research "India Cold Chain Market Forecast & Opportunities, 2017" the cold chain market of India is anticipated to grow at the compounded annual growth rate CAGR (Constant Annual Growth Rate) of 28% during 2012-2017, which will make it a whopping US\$ 11.6 Billion (Rs. 6,600 Crore) market. The Indian cold chain market is highly fragmented where more than 3500 players are present. There are a large numbers of small players present in the Indian cold chain industry; some of the well-known organized companies are Snowman, RK Foodland Pvt. Ltd, MJ Logistic Services Ltd, Fresh and Healthy Enterprises Limited (FHEL) etc. Over the past few years, Indian cold chain industry has shown some positive changes. Private sector participation has increased in the cold chain industry to cater to the increasing demand for cold chain logistics. The majority of the cold storages built in last few years are meant for multi-purpose storage and this trend is expected to continue in coming years as well. The focus of cold chain logistics provider has been increased towards the milk & milk products, frozen fruits and vegetables, meat etc. The low profit margin in traditional items like onions, potatoes etc. has led to an increased focus on high valued items. Government of India has taken various initiatives to attract private investment in this sector. Even though these initiatives have not witnessed any dramatic changes till now but in coming years they are expected to reap the fruit. The demand for cold chain logistics from pharmaceutical industry,

organized retail has been growing constantly. These sectors are booming at great pace which will further enhance the demand for cold chain logistics in r future. The shift towards processed food and horticulture are also anticipated to increase the demand for cold chain industry in India. It is expected that many large domestic and foreign companies will join the league in coming years to cater the growing demand of cold chain logistics. This will inject required investment and latest technology in the Indian cold chain industry in near future. Cold chain industry of India is also expected to bring some major mergers and acquisitions by the big companies to establish their base and to expand their reach.

Conclusion

In summary, Cold chain logistics is one of the fastest growing sector in India. Growth in the food processing sector and organized retail drives huge opportunity for the cold chain market in India. Further shift towards horticultural crops by farmers to evade risk boosts the demand for cold chain. Rising demand for cold storage in pharmaceutical sector is also driving the growth in cold chain market. Changing consumption pattern is expected to create huge demand for cold storage in India. Globally the focus now has shifted from increasing the production to better storage and transportation of food produce. Cold Chain now has become an integral part of the supply chain management for the storage and transportation of temperature sensitive goods. Utilization of cold chain logistics includes both the cold storages as well as refrigerated transportation and is used to increase the shelf life of food produce. The Indian cold chain market in the last few years has gone through various positive changes. An overview of the

cold chain system in India over the past 50 to 60 years shows that the cold storage construction technology, refrigeration plant technology, the practices of thermal insulation, automation and material handling have undergone significant transformation. From the point of view of utilization also, the cold stores today offer much wider scope than in the past. Energy saving and the Green Cold chain concept are also being seriously looked at by the progressive entrepreneurs and designers. However it must be realized that for a country which is number one in terms of milk production and number two in terms of Food & Beverages production, the overall storage capacity of around 25 million MT of cold storage available in the country cannot be considered adequate and there seems to be a good potential for the development of modern and energy efficient storage units. National Horticultural Board has taken a big step in creating technical standards for cold chain projects. The following three standards have been developed with help of experts in the industry and are available to the promoters & designers of cold chain projects for reference. Cold storages for storage of fresh horticulture products which do not require pre-cooling. Controlled Atmosphere (CA) Storages. Multi-commodity Cold storages for short term and long term storage of fresh horticulture products which require pre-cooling and varying storage requirements. Apart from these, the standards on ripening chambers and refrigerated transport have also been recently released for public review. This is the first attempt of Indian Government agency to formulate such standards for cold chain projects in India, Efforts are on, for making standards for Ripening chambers and Refrigerated Transportation. Government agencies like National Horticultural Mission,

Ministry of Food Processing and National Horticultural Board have also offered higher financial incentives for the new projects as well as for expansion of existing units. However, these projects have to be essentially based on modern and efficient technology in tune with the technical standards. A scientifically developed Cold Chain, designed to handle and preserve the substantial quantity and excellent quality of food products grown in India, would turn into a ' Gold Chain' for India.