



National Centre for Cold-chain Development

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Newsletter

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The CEO's Desk

NCCD had been frequently toying with ideas on how to ease the business of cold-chain. The critical area of attention in any enterprise that requires interconnected activities, is the zone where an ongoing activity is outside of sphere of immediate and active influence. In space exploration, this starts when the craft is shot off its Launchpad – in cold-chain this is when perishable goods are in transit from point of origin to point of destination (between an OD pair).

This period in-transit, is the phase where any delay or mishap cannot immediately be acted upon, since access to the tools of redressal or replacement options are limited or far removed. In fact, some of the possible counter activity is beyond the scope of the cold-chain operator.

Since, some of the problems faced enroute would need solutions that must be addressed through other agencies, the idea of having a central problem recording mechanism was developed. NCCD's RVC or reefer vehicle call-in-centre was launched this month by Hon'ble Union Minister for Agriculture. Read more on this in this edition.

This month, the ripening chamber trainings underway in southern states, ably being executed by "Samagra Agribusiness Systems", was approved for extending into northern states. This half of the country will be handled by "ICE Centre for Excellence", also following a curriculum that provided employment based skills as well as educating entrepreneurs on the opportunity in safe fruit ripening.

In September, NCCD also addressed the Summit on Indo-South African Cooperation in Food Processing & Agriculture. This event, held on 11 Sept, was preceded with a meeting in the previous week with Citrus Growers from South Africa. It was reaffirming to learn that every farm in South Africa, had a modern pack-house with pre-coolers, et al. A farmer, who could own as many as 5 farms, would have an many such facilities. Of course, the 'farm' referred to was typically 120-150 hectares, but surely we too could do with a modern pack-house facility covering 200 hectares of perishable crops. The result of empowering perishable crops with extended life spans, meant that South Africa could export a major share of their crops. A country only about 1/3rd the size of India, was managing to export and capture multiples of India's share of the export market. Having the right infrastructure as the tools, opens up more opportunities than otherwise possible – at least in case of perishables.

-Pawanexh Kohli

RVC - REEFER VEHICLE CALL-IN-CENTRE

A series of meetings to discuss various projects and concepts on cold-chain applications, including continued Government support to this sector were held in September. While examining various aspects, discussions would frequently revert to the scope of enhancing and easing of funds from financial institutions as well on the future direction and the perception of fiscal and financial incentives provided by Central and State Governments.

However, cold-chain needs more than eased access to project funds or the incentives provided by our Government to induct improved technologies – it also requires a supportive operational environment, specially as the core work sphere is not limited to the boundaried walls of a factory. Our domestic cold-chain stretches across a diverse landscape; at one end rural backdrops, sweeping across the sub-continental terrain and at the other end urban cities and townships. This is coupled with the fact that the transport links in the chain has a direct impact upon the quality, shelf life and price realisation of the goods under care. While in some cases, when the origin points are food processing factories or vaccine centres the situation may feel a bit eased, the fact remains that cold-chain is a time bound exercise. Any holdups or a delay within the operational sphere will immediately raise the risk factors, as well negate any value gain. After all, the products under care are perishable & time is money!

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OP-ED INVITATION:

Readers are invited to articulate their ideas, concepts & comments which will be nominated as Op-Ed articles.

Hon'ble Shri Radha Mohan Singh
Union Minister of Agriculture



launches

24 x 7 x 365 Reefer Vehicle Call-in-centre (RVC)

Toll free number- 1800 267 6223



An e-governance initiative by
National Centre for Cold-chain Development

Salient Features

- Toll free access for refrigerated transporters for recording of complaints about in-transit bottlenecks.
- To help in identifying en-route delays for reefer transporters.
- Complaints received to be centrally recorded for relevant action from state and central authorities.
- To help in long term corrective actions to redress in-transit delays.



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Stakeholders operating in the complete cold-chain, frequently complain about delays and bottlenecks on the highways which lead to unnecessary risks and expenses. These bottlenecks range from infrastructure hardships to delays in documentation checks and even roadside extortion. In a series of interactions, including a first ever reefer transporter's conclave held by NCCD, an assortment of concerns were raised, indicating hesitancy to scale up operations by the refrigerated logistics sector. Yet, there was no hard data presented, or a record of such problems available. There was clearly a need to develop a central information gathering mechanism, where such concerns could be logged. The information reported would be studied so solutions could be devised and spearheaded.

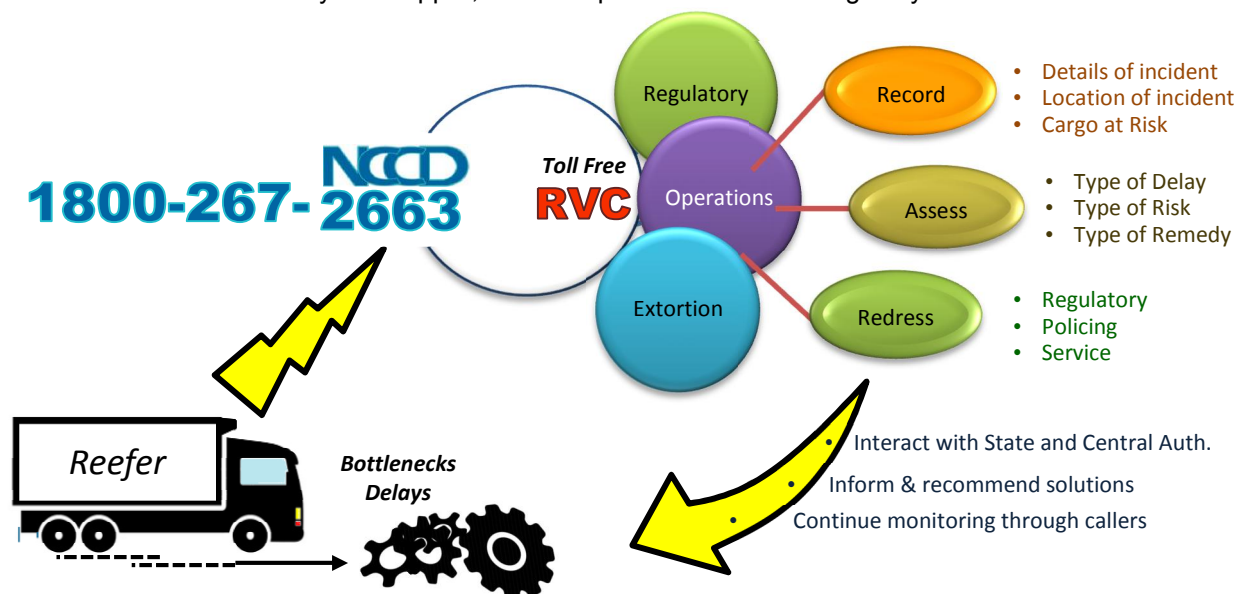
NCCD member, Mahindra Logistics stepped up to the mantle, offering the resources of their IT team and their existing call-centre to execute the RVC (Reefer Vehicle call-in-centre). A flow chart was developed into the necessary software and 1800-227-2663 (NCCD) was launched on 12-Sept-2014.

The RVC was given a boost when Hon'ble Union Minister for Agriculture immediately recognised this as an important e-governance initiative. On launching the RVC, he said that this was in harmony with the Prime Minister's vision of introducing e-governance measures, particularly in the agriculture sector. He added that the response generated from this exercise will help to devise long term plans and policies to alleviate bottlenecks and thus fast track the transport of perishables in the country.



Shri Radha Mohan Singh, Hon'ble Minister of Agriculture making the first call to the RVC

The program succeeds with the whole hearted participation of the reefer operators as "bhagidaars" as they share and record the bottlenecks faced. This is core to the concept and the more details that are provided, the greater will be the impact of the information, providing the ability to translate into corrective measures in the future. At this writing, more than 200 calls have been received, with about 20 of them specific to troubles faced while in-transit with perishable goods. These range from poor or incorrect documentation by the shipper, to undue provocation on the highways.





Oddities notwithstanding, the entire trucking sector in the country is simply huge, but in case of actively refrigerated vehicles is estimated to comprise of approximately 8000 to 9000 in numbers only and another 30000 insulated but non-refrigerated vehicles. This number is miniscule for satisfying the transportation needs of the cold chain – something which is on an ever growing trajectory. Across all transport sectors, the nature of cargo varies but what remains uniform is the nature of the problem – inordinate in-transit delays owing to various reasons including infrastructural bottlenecks and cumbersome regulatory procedure, stakeholders in the transport business always seeking solutions.

It is no secret that the most difficult process in the supply chain, is managing the inventory in transit. When moving perishables- items like ice creams, butter, pharmaceuticals, meat, fruits and vegetables, etc. - any delay on road especially if there is a large time lapse because of some malafide intent, the cost can be dear. Any delay or operational hassle to inventory in transit, may lead to the goods to lose its value in quality, quantity or subsequent storability. It is informally reported that reefer vehicles are often stopped on the roads by criminal gangs, hoodlums, all aiming to extract some gratuity. Doors of the cold compartment may be purposely opened, multiplying the risk to the goods.

Sometimes even legitimate stoppages become cumbersome. The concern is: even genuine checks can cause delay in perishable transit and the question is how to best intervene, to streamline has hasten these. Can we make sure that the most sensitive link in the chain, the transport of perishables, can be put on the fast-track? If you consider Europe, reefer vehicles carrying perishable food are stopped only at international border check points and provided priority at that. Similarly, a priority berth is offered to reefer ships in ports, even if ETA is delayed. In our country too we need to reduce the number of stoppages within and at state borders and plan a priority checking system.

The food losses in the country cannot be alleviated by creating adequate cold chain capacity alone. There are other important processes involved and the greatest risk to perishable goods is when under haulage. Solutions to reduce the time spent on roads, and the bottlenecks enroute need to be devised. Efforts are required to ensure that the perishable cargo spends the shortest possible time in reaching to the markets.

Fast track movement of perishables will reduce pain points and aid the cold-chain at multi-fold levels. It will lead to the greening of the cold-chain by reducing fuel used both in cooling and transport, it will minimize risk of food waste and ensure that the shelf life extension is not depleted in held-up inventory but actually used at consumer shelves. It will reduce the cost of cold-chain and will bring more stakeholders into the fold.

24 x 7 toll free Reefer Vehicle Call-in-centre

In partnership with Mahindra Logistics, a toll free number is provided and the refer transport driver can call in directly and register concerns related to unwarranted stoppages and on-road problems. The subjective definition of these stoppages would need to be provided by the caller. Calls can also be initiated by the cargo owner, the transport owner though it is expected the onsite drivers will be the primary initiators.

Seen as a reformist step, the RVC will document their concerns which will be analysed to devise solutions thereof. Naturally, the redressal plans or corrective measures will be possible with the active participation from stakeholders, as the information provided will give direction to bring into alignment interventions that in future will facilitate smooth movement of perishable food products in the country.

The logistics sector involved in cold-transport can benefit from this initiative, globally a first. by having a single point option to officially record their in-transit complaints. The information would also help the operators to narrow down and avoid specific stretches on the highways where delays are prevalent, or seek added attention in regions on the regulatory front, etc. All of this would translate into a cost savings. The policy makers will benefit as recipients of structured base line data, specific to perishable trade and its bottlenecks, and be able bring to focus required amendments. The nation would take a step closer towards hassle free movement of perishable items.

Bell Peppers get out of this World

The crew of the International Space Station usually feed on processed foods - dehydrated, flash dried or in form of paste. On their request, a load of fresh bell peppers was shipped, lifting off in the SpaceX Dragon on 21-Sept from Cape Canaveral. While using MAP packages, lack of refrigeration will not let these bell peppers last longer than a week.

Vietnam to start use CAS for Litchis to Japan

CAS (Cell Alive System) is a technology that counters the ill effects of cell wall damage that occurs in other freezing techniques. Using a process that combines a rotating magnetic field (MRI) and freezing, the final product is said to retain 99.7% of its aroma, flavour and texture for 2 years. The technology may in help cryogenic preservation of humans.

COLD-CHAIN INSIGHTS

-V

Pawanexh Kohli

The importance of integrating the cold-chain components has frequently been glossed over by many investors. Their focus has tended to lean towards the storage aspect of a “cold-chain project”, which is a narrow interpretation and excludes various other necessary infrastructure needs. There could be valid reasons for this, but let us assess and understand how a cold store is only a small share of the overall cost of an integrated cold-chain infrastructure project.

Since a cold store is familiar to everyone, let us review a hypothetical project planned around this hub of activity. The assumptions are as follows – a 15,000 cubic metre temperature controlled facility (~5000 tons storage capacity), designed to store multi-commodity products, has multiple chambers, capable of storing products in the entire range - mild-chill, chill and frozen (0°C to 15°C and <-18°C). We are describing a cold store touching the front end, one that facilitates temperature-controlled distribution to an adjoining consumption centre, servicing one or more of our cities.

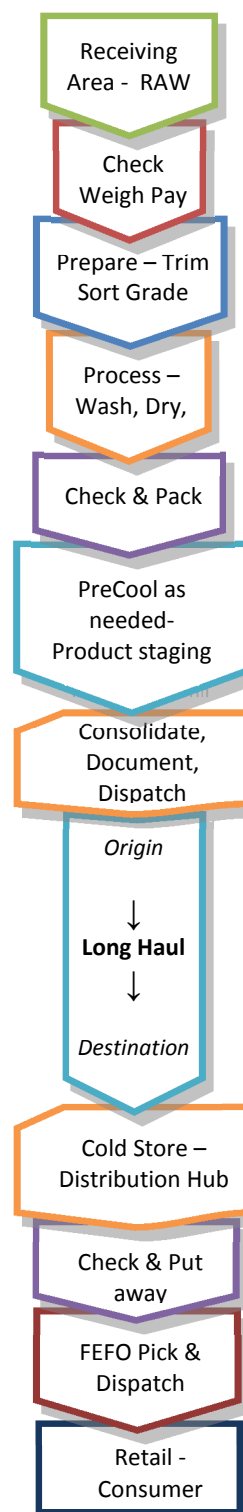
Such a facility will typically have (or would target), a daily throughput of fruits, vegetables, ice cream, poultry and various other food items. It might even have a few ripening chambers though this option can be at another location, conveniently closer to retailing areas.

What is the core agenda of the product owners? To get their product on the shelf... What is the best option for the cold store owner? To move the product out as he earns additionally from such service... even more so, if he also is the owner of the products. Therefore, for all parties, the main theme is to get the food products on the shelf, to reach a sale! A 5000 ton distribution store will not service only 5000 tons per annum, but it will strive to rotate that volume weekly, or every few days. Much like a 50 seater restaurant will want to turn that many foot-falls or seat turnovers every few hours (they do not appreciate someone hogging the table for long). The annual throughput of such a cold storage unit is going to be in many multiples of its static capacity, which translates into more revenue. In case of bulk storage units, such multiples result from adjusting the transaction times of the commodity stored.

Getting back to the distribution business model – let us assume the cold store in question, does poorly and only manages to rotate its storage space once every 30 days. This means that over twelve months, it will actually handle an average throughput of 60,000 tons of products through its facility every year.

Now let us assume a reefer vehicle with carrying capacity of 15 tons. Further, we factor that the average travel from source to this hub is about 2.5 days. Add to it the loading/unloading/waiting times and, for convenience, let us presume it directly returns to source point. Effectively, a 7 days round trip for each 15 ton load. If working non-stop for 52 weeks, the throughput capacity of each such vehicle is 780 tons per annum. Let us up this figure, for arithmetical convenience, to 1000 tons per annum per truck. This means, the assumed cold store will need to have at least 60 refrigerated trucks of 15 tons carrying capacity servicing or attached to it.

Now let us assume that 20% of the capacity of this 5000 ton cold store (i.e. 1000 tons), is slotted for horticulture products – fruits and vegetables, which will not normally reside in its cool interiors, no longer than 4 days, before either perishing or reaching a shelf. A lot of grapes, apples, kiwi, avocado, broccoli, etc. are imported and pass through such stores onto our retail outlets. This means, to occupy and utilise that 1000 tons of space, an equal amount should flow through it every 4 days. For our domestic produce to access this route to markets source points at our farms – necessary to reach consumers farther than 48 hours away – must output at least 1000 tons every fourth day, into the cold-chain. At farm level, doing this job, we have modern pack-





houses with pre-coolers and let us assign each pre-cooler (or pack-house) an output capacity of 15 tons a day. Every 4 days, 60 tons of pre-conditioned produce could be dispatched.

To receive 1000 tons every 4 days, this cold store will need to be associated with about 16 pack-houses with a unit capacity of 15 tons output every day. These will serve as the source points for some of the earlier assessed reefer vehicle numbers. The other source points would be ice-cream factories, abattoirs, poultry farms, processed food factories, etc.

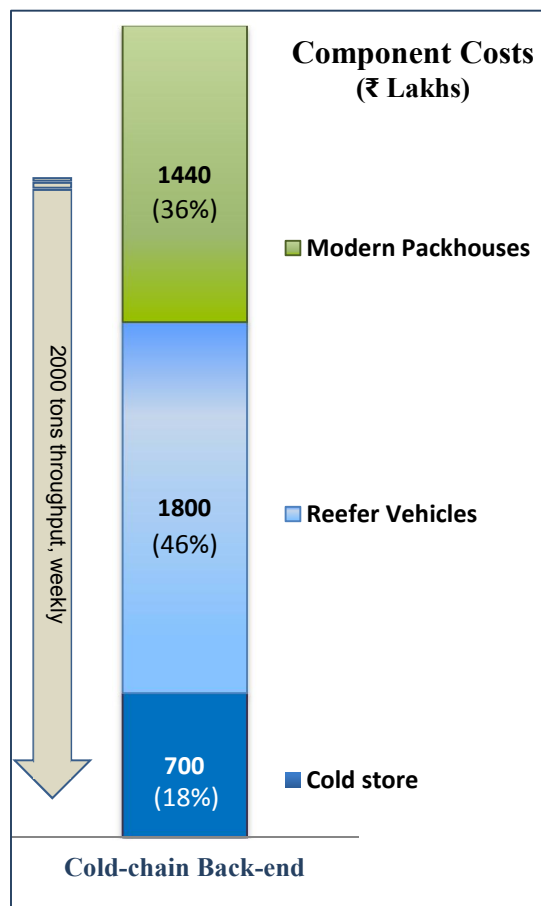
Now review these numbers, this hypothetical integrated cold-chain project – a **cold store** serving as a distribution hub (capacity 5000 tons), **16 pack-houses** (capacity 15 tons a day of ready to retail cold-chain produce), **60 refrigerated vehicles** (capacity 15 tons load). This ignores other infrastructure such as ripening chambers, last mile retail transport and what goes into retail end.

A 5000 ton capacity modern cold distribution hub would cost around ₹ 7 crore to build, each 15 tonner vehicle would cost in the range of ₹ 30 lakhs and a modern pack-house with mechanisation, a pre-cooler and a staging cold room would cost at most about ₹ 90 lakh per unit. The entire cost of infrastructure for this project comes to about ₹ 39 crore and the cold store is less than 20% of this cost. The cold store is actually a logistical necessity and world-wide, the cold-chain automatically evolves to minimise the touch points between source and consumption, all that remains is what is necessary to serve the pipeline. Cost of land for cold stores and pack-houses is not considered – that is a growing value proposition on its own, leveraged to develop the service.

The logistics industry also needs to understand what their play is in the cold-chain. Unlike any other type of logistics service, the cold-chain service provider is key to the final product. In case of whole perishable foods, the value is harvested and quality is on a perpetual downward spiral, fighting against time and the environment. The logistics person directly affects the quality and saleability, impacting upon the final price realisation. In fact the person who manages the supply system becomes more valuable than even the producer. The cold-chain person is not just a delivery boy, instead such a person is the guardian, protector and the redeemer of value as it may be finally realised. Globally, all the major cold-chain companies started as logistics services and progressed onto becoming the producer/owner of the goods, creating food brands. Currently in India, the cold-chain domain has few takers from integrated logistics players, this space having been largely left to storage providers only.

Much like a tradesman needs an understanding of and access to all the tools of his trade (a hammer has little use without the nails, or other add-ons), having all necessary infrastructure components that make an integrated cold-chain is important to fulfil the intended objectives.

In understanding the importance played by integrated logistics in the cold-chain, the Government in its revised scheme guidelines has kept a holistic view and has provided special incentives for various infrastructure components. Other fiscal benefits such as Service Tax exemption and tax deductions are also provided. The people of India through our Government support integrated development in this sector, with the reason that it opens opportunity to our farmers and secures our food supply. This support ought not to be misconstrued as mere funding of isolated infrastructure but intended to promote the development of strategic supply lines, integrated so as to empower our farming citizens, satisfy the consumers and make India secure in terms of access to food and nutritional fulfilment.



FIRE AND ICE

Pawanexh Kohli

In school, we learnt that the greatest boost to human evolution occurred when our ancestors learnt to manage fire. Domesticating fire for the purpose of cooking is considered the supreme causal factor for hastened evolutionary development of homo-sapiens. Today, no human group eats all its food raw.



Ancient humans grazed constantly to find enough calories to survive, similar to the way apes and gorillas do today. Raw food, by mass, does not contain that many calories and thanks to Fire, a shift to cooked food diet was possible, that allowed humans to pack more into their daily meals. Receiving the extra calories effectively allowed our ancestors to divert efforts from more mundane survival linked activities and kick-started the grand civilization and the myriad cultures we are today. Research also highlights another impact from being able to receive these extra calories - it allowed the human brain to evolve into a bigger and better powerhouse. the number of neurons in your brain and their daily working is largely dependent on the number of calories you can consume in a day and there are only that many hours in a day.

If we were to feed on only raw uncooked food, we would need to chew for more than 9 of our waking hours each day. Without fire, even if we had the chewing prowess of chimps, *which delivers them a rate of 400 food calories an hour*, after done gathering the food we would be chewing it for the rest of our waking hours. Either that, or our brain size would not be sustainable.

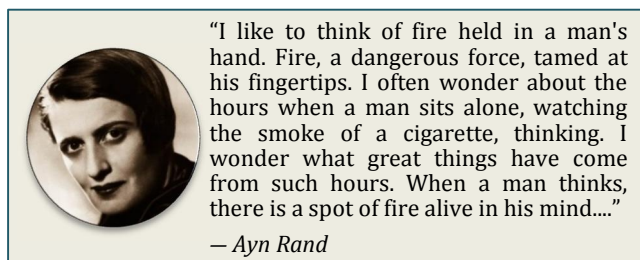
Your brain, about 2% of body mass, uses 20% to 25% of the energy needed by your body at rest!

Around 900,000 years ago, fire was domesticated into our hearths, coinciding with a peak in glacial activity and global cooling, fire helping the genus Homo to survive. This was the period of our ancestor Homo Erectus, who evolved a better brain after learning the ability to cook food into a readily digestible format. The freeing up of calories from other foraging activities, released energy for the brain to develop faster. **Fire therefore, delivered us from the laborious and time consuming task of digesting raw food, unshackling us for other sublime activities.**

Domesticating fire was indeed an epoch changing event, mutating nomadic tactics, allowing the human species to settle down, practice agriculture, develop pots and pans and weapons, to move into more scientific pursuits and some others whimsical. Fire symbolised power and epitomized control, with all ancient cultures having a fire-god empowered with this force! *Fire and controlling its power has been admired always and our sciences have evolved largely around tapping this source of energy.*

In most mythologies, fire is said to have been 'borrowed' from the gods. In Greek mythology, Prometheus a Titan (considered eternal friend of mankind), stole fire from the gods to share with humans, and for this forbidden act incurred the divine wrath of Zeus (king of gods) who chained him and had birds feed on his liver. In Indian mythology, the Rig Veda tells of Mātariśvan, the individual responsible for bringing forth knowledge of producing of fire by friction; Agni (fire) had gone into hiding but was rekindled from afar by Mātariśvan, and earned the respect and praise of both the gods and ordinary humans.

In all ancient folklore, knowledge of fire and its sharing was seen as a significant & empowering turning point, with the deed doer involved being considered as friend & liberator of humankind.



"I like to think of fire held in a man's hand. Fire, a dangerous force, tamed at his fingertips. I often wonder about the hours when a man sits alone, watching the smoke of a cigarette, thinking. I wonder what great things have come from such hours. When a man thinks, there is a spot of fire alive in his mind...."

— Ayn Rand



Most of recent industrialisation and the powerful machines we use, depend on from some fiery form of energy. But fire has not always been beneficial and misuse of its destructive force is well known. Control of Fire also brought about most of modern day ills – higher population growth from more assured food options, sedentary lives and a comfort zone beyond naturally sustainable means. Even the discomfort of cold is now countered with artificially generated heat.

Non-sustainable population growth is a key impact. It took all of human history until around 1800 for world population to reach one billion, the second billion was achieved in only 130 years (1930), the third billion in less than 30 years (1959), the fourth billion in 15 years (1974), and the fifth billion in only 13 years (1987) and 12 years more to reach six billion in 1999. In 1969, there were half as many people as there are now, 7.2 billion, this doubling happened in only 45 years.

Civilization is at tipping point where our capacity to feed our numbers is a matter of increasing concern

Our civilization has reached a tipping point where our capacity to feed our numbers is a serious matter of increasing concern. Science helped increase food production but all food is organic matter and most of it perishes before it can reach people. The science of delivering what we produce needs more... it needs **harnessing the power of ICE**.

It has become imperative that mankind fully grasps and controls the power of ice, so that our species can continue to thrive and prosper. This is a new epoch, the age when both Fire & Ice must work together, where our evolution stands on the brink to take another leap forward. This is to surely be the **age of "Fire & Ice"**

The process initiated a hundred or so years ago, with the advent of mechanical refrigeration & transport. Today, cold-chain or the use of temperature regulated distribution based logistics, is a common phrase. The success of cold-chain depends on how well we are able to manipulate its effects and counter its negatives.

Though Da-Vinci is recognised as the first to use a mechanical air cooler, historical records also indicate that the Indian subcontinent was the first location where evaporative cooling was used, a millennia ago. Even today, ~50% of evaporative cooling globally is used in India, with ~20% of global happening in USA.

The majority of refrigeration today is based on the same key principal, that latent energy is released from a phase change that is forced upon a cooling or refrigerating fluid. This has not changed from that millennia ago, when first used in what was then India. Most of recent scientific research has since been directed to develop cheaper or more efficient refrigerants and of late for those that have a lesser impact on our environment.

In recent decades, a few other refrigerating methods have also been developed and deployed. **Thermo-electric** cooling is the temperature differential achieved at an electrified junction of two different conductors. Also called the Peltier effect, it is used to create refrigerators with no circulating fluid or moving parts. **Magnetic refrigeration** utilises the magnetocaloric phenomena or adiabatic demagnetisation wherein a temperature change is caused by exposing a material to a changing magnetic field. Very low temperatures <10°Kelvin or (minus) -263°C can be reached. **Acoustic cooling** is another technique, where sound waves are used to produce the cold.

In physical terms, the counter to fire is ice... surprisingly, there are no "ice gods" in mythology

We are far from fully understanding and harnessing the cold. Conventionally, the cold was viewed as something to be kept at bay – maybe a reminiscent of ICE age fears. Though, it is now being recognised that to feed out populace, cold-chain and similar allied sciences, is crucial for the future of mankind.



CARROTS



Some factoids about Carrots गाजर

The Greek called it Philtron, a love medicine that made men very ardent and women yielding and the Roman emperor Nero is said to have ordered annual loads. The carrot was not orange in those times, but mostly purple in colour. The orange carrot is said to have been developed in the 16th century though selective breeding, attributed to a show of support for the William of Orange for freeing Holland from Spain; it was then adopted as the royal vegetable too. These days, carrots are synonymous with the colour orange, far removed from its original purple, white and yellow shades.



During WWII, the myth spread that eating carrots improved night vision, resulting in many European kitchen gardens growing carrots. This myth was popularised by British propaganda, who created this urban legend during the Battle of Britain, claiming eating carrots had improved their pilots' night vision to hide their prowess in radar technology. Eating carrots will not usually do anything more for your vision or improve nocturnal sight if you have a normal diet and the body does not absorb more Vitamin-A than it needs.

Carrot Respiration rate:

- ❖ @ 0°C: 5 - 10 ml CO₂/kg·hr
- ❖ @ 5°C: 7 - 13 ml CO₂/kg·hr
- ❖ @ 10°C: 10-21 ml CO₂/kg·hr
- ❖ @ 15°C: 13-27 ml CO₂/kg·hr
- ❖ @ 20°C: 23-48 ml CO₂/kg·hr
- ❖ If kept with top bunch this will double

The above rates are for topped carrots (shoots are removed). When kept Bunched (presence of top shoots) carrots are highly perishable and will last 8-14 days in storage at 0°C. Mature topped carrot roots can be stored for up to 6-9 months in cold stores.

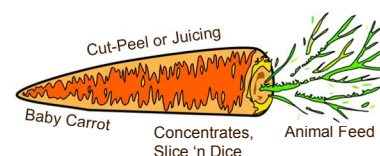
Carrots do not produce much ethylene but are sensitive to ethylene exposure. Carrots will develop a perceptible bitter flavour when exposed to even a little ethylene and should not be stored with ethylene producing products. Store separately from most fruits, tomatoes and pre-cut vegetables.

Carrot Storing:

- ❖ Ethylene – high sensitivity - do not store with ethylene producers.
- ❖ Rapid post-harvest hydrocooling is most effective for optimal keeping quality. Even at homes, do not store freshly harvested carrots without first washing in chilled water.
- ❖ Post-harvest life potential 6-9 months at 0°C, and 3-5 months at 4°C for mature roots. Immature roots will last only a month or so. When stored with tops (Bunched), the post-harvest life is a maximum of 2 weeks.
- ❖ A High relative humidity is essential to maintain crispness. RH level of 98% is recommended. Free moisture from washing and condensate to be checked as it promotes decay. This is typically seen when storing in plastic bins – liners, with fluctuating temperatures causing condensates.
- ❖ Low oxygen storage (controlled atmosphere cold storage) does not provide any resultant gain in post-harvest life. Further, less than 3% O₂ is not tolerated well and is known to result in rot. When packed in MAP (modified atmospheric packaging), carrots last longer at retail and consumer end.

Using carrots:

Gajar halwa and juice is a common use for carrots, besides other dishes and salads. Did you know that carrot juice has been used as printing ink, its fibre is used to create nano-based bio-composites as strong as carbon fibre and has also been used to create insecticides.



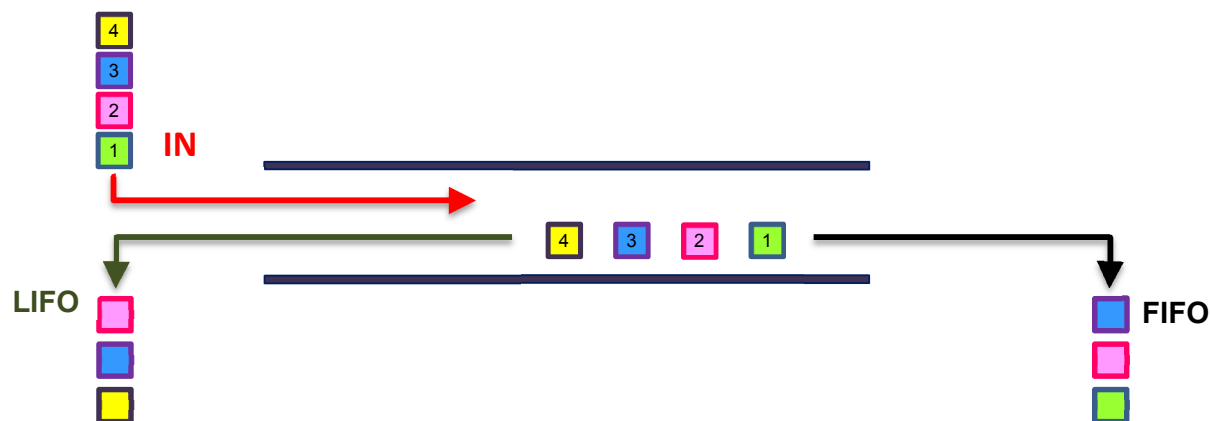


NCCD Glossary of Cold-chain

Our CEO, Mr. Pawanexh Kohli, frequently explains processes or methods used in cold-chain as an ongoing attempt to harmonise the understanding and definitions of various aspects of cold-chain. Read about LIFO / FIFO / FEFO.

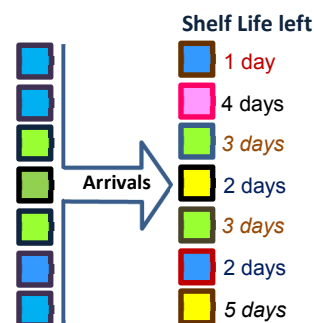
LIFO [*Last-In, First-Out*] is a method of storing and retrieving goods, where inventory rotation is a matter of logistical convenience. This is usually employed where the storage space or warehouse capacity is limited and or the physical access to the inventory is restricted. For example, if packing a picnic basket, or the trunk of your car, one would intelligently place the items that are expected to be needed first, last. In cold-chain, this is most commonly used when following the “stuffing” principle in transport. This principle is commonly used when making milk-runs (piece-meal off-loading) in retail distribution, so that the items to be dropped-off first would be loaded last into the carrier. A staging area is used for preparing goods for LIFO loading onto large transport as an operational good practise. A logical understanding of the route and a segregation of goods accordingly, gives priority to the loading sequence. Depending on a facility’s position in the supply chain, the service may need to plan for LIFO. This method is not otherwise used when storing perishable goods long term.

FIFO [*First-In, First-Out*] is a method of storing and retrieving goods, where inventory or material flow process is smooth – this is a pass-through method. For example, a conveyor belt or where inventory storage period is so short, that applying any other logic is superfluous.



LIFO and FIFO are commonly used methods applied to all types of goods and not exclusive to perishable inventory. Both principles are also used as accounting techniques to manage cost flow assumptions related to inventory and various other accounting purposes.

FEFO [*First-Expire, First-Out*] is exclusive to handling of perishable goods. This involves intelligent stock keeping and storing so that inventory items that are expiring first are the ones to be selectively picked and brought into use. Such a method would be employed, for example, in case of an inventory of batteries or say, when you have two similar batches of yogurt or vaccine in your fridge. This inventory handling method in case of cold-chain is most critical to value realisation of goods. In case of whole food (fresh food), globally the largest segment in cold-chain, & where no expiry labels are used, a mix of FIFO and FEFO is used. FEFO requires educated understanding of the life cycle of individual batches of perishable goods, including integration of information from source points. Two batches of kiwi from the same pack-house may arrive at the same time from two different farms with differing life spans, or vice versa, or may have incurred cold-chain excursions leading to a cumulative and varied impact on its remaining saleable life. FEFO is a grass root understanding, comprehended by farmers.



A bite from this Tick can turn you Vegetarian

Lifelong meat eaters are forced to swear off red meats once bitten by this mite. A bug, named the Lone Star Tick, makes its victim allergic to all red meats (and some dairy & poultry products). Get bitten by this tick once, and each time you eat red meat, a severe life threatening allergic reaction occurs – symptoms include swelling of lip and tongue, extreme itching, airways close up, nausea, diarrhoea and anaphylactic shock. About 1500 people in USA are reported to be suffering from this tick bite and reports keep coming in. Once bitten, nothing can be done to prevent the reactions. Meat-lovers are advised to avoid getting bitten.





LUMINARY SPEAK



**Mr. Pravesh Sharma – Managing Director, SFAC
(Small Farmers Agribusiness Consortium)**

SFAC has developed an enviable reputation of being the premier institution that focuses on developing and empowering Farmer Producer Organisations. Do you see FPOs adopting cold-chains?

Farmer Produce Organisations (FPOs), are independently run companies. If an FPO is producing and trading in perishables and wishes to expand its market footprint into regions and areas that can best be accessed and served through the cold-chain, I surely see them taking on that option. The concept behind FPOs is to bring empowerment to groups of farmers and wherever this modern supply chain system empowers them further, it will not be

overlooked. After all, with the associated economy of scale and increased bargaining prowess, it would be a natural step to reach out directly to new and more profitable markets – cold-chain offers this opportunity to producers of perishable produce to expand their market reach, and safely take quality products to many more buyers.

You recently launched the Kisan Mandi in the outskirts of Delhi. Would you please explain the concept to our readers?

The Kisan Mandi is a platform provided by SFAC where individual farmers, collectives or FPOs can directly sell their produce to wholesalers and end-consumers. The Kisan Mandi will be providing a direct interface between farmers and buyers and in doing so, both will be able to build partnerships and a better understanding of the quality requirements of the market, from a transaction point that is closer to the end consumer. The Kisan Mandi will also bring transparency both to farmers and buyers - transactional transparency in the food trade directly impacts the overall value chain and keeps it from running amok. Hence, the Kisan Mandi will serve as an important yardstick, adjoining a high population centre, to bring greater alignment and understanding to all stakeholders. So, most importantly, the Kisan Mandi will be a competitive fresh food outlet for farmers and consumers, albeit one that brings the market and source closer. The success of this first, may very well initiate the launch on many more.

Cold-chains are most practical when they function as a link with multiple markets across regions. Do you see the use of cold chains in such Kisan Mandis?

We will largely leave the decision to use temperature-controlled logistics to market dynamics. Personally, I see that farmers and associated FPOs will initially focus on marketing the hardier crops such as potatoes and onions, through this Kisan Mandi. If the market requires them to supply, say tomatoes or lettuce from Karnataka, or Kiwi from Arunachal Pradesh, it is but natural the cold supply chain would be required. If the market demands fresh bananas, I can envision an FPO from a banana growing area stepping up to fulfil that need with a modern ripening facility at the Kisan Mandi. Similarly bell pepper or mushroom trade would surely need cold-chain facilitation. Yet, these are early days, and we will see how the market and the farmers together give shape to the Kisan Mandi in the days to come.



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NCCD is an autonomous body set up by the Government of India with the aim to facilitate cold chain development across all user segments through policy intervention, capacity building and standardisation. NCCD has participation from private industry, policy makers, knowledge partners and government agencies.