Cold-chain Task-Force
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Meeting-1
Harmonising the Concept Development / Components / Users

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Introduction | Harmonising the concept
Cold-chain Objectives | Components
Current Status of Cold-chain components
Reservations in future development
Missing Links and investment estimates
Flow of produce in the cold-chain
What needs doing
Examples - Understanding the need
Categorise the products
Free fund, Subsidy or Incentive
Summation
Cold-chain for fresh produce

- Cold-chain is a series of logistical activities, integrated to serve as a means to supply environment sensitive produce.
- Cold-chain originates at a source point and ends at point of consumption. It will have transient touch points (cold stores) as a logistical necessity, determined by holding life of the goods.
- Holding life of the majority of fresh farm produce, even in the cold-chain, ranges from a few days to a few weeks only.
- Bulk of fresh horticultural & floriculture produce benefit from cold-chain - as the crucial market link, that makes it technically feasible to supply to multiple & distant market locations, within the produces’ enhanced life span.

Serves no real preservative function, but stretches the produce life for a reaching a sale.
Cold-chain - for Value Preservation

<table>
<thead>
<tr>
<th>Procure / Precondition</th>
<th>Transport</th>
<th>Storage</th>
<th>Delivery</th>
<th>End Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Producer</td>
<td>• Climate Controlled Long Haulage</td>
<td>• Cold Storage</td>
<td>• Refrigerated Secondary move</td>
<td>• Retail</td>
</tr>
<tr>
<td>• Farms</td>
<td>• Distribution Centre</td>
<td></td>
<td>• Consumption</td>
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### Cold Chain

<table>
<thead>
<tr>
<th>Segments</th>
</tr>
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<tbody>
<tr>
<td>Transportation</td>
</tr>
<tr>
<td>Uses refrigerated trucks, vans, containers, air, rail and ships for transporting perishable produce</td>
</tr>
<tr>
<td>Static Infrastructure</td>
</tr>
<tr>
<td>Consists of pre-conditioning units, refrigerated storage, distribution and retail of perishable products</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market linked Delivery</td>
</tr>
<tr>
<td>Activities related to connectivity—packing and distribution of produce to multiple markets</td>
</tr>
<tr>
<td>Quality Assurance</td>
</tr>
<tr>
<td>Care that assures Technical and Quality parameters to extend Holding Life and Saleability.</td>
</tr>
</tbody>
</table>

Cold-chain is value securing logistics for harvested horticultural produce and for manufactured products

Cold-chain keeps foods Fresh - do not confuse cold-chain with manufacturing activity of Food Processing
Food Processing (FP) is a series of production activities, akin to any industrial process where raw produce is transformed into a food product - physical, chemical or composite change to the raw produce, mainly to manufacture a food product for delayed consumption.

Primary use of FP is optimising on productivity by bringing into use culled harvest or would-be-waste, by processing it into edible product.

Cold-chain is necessary for milk products, many meat products and semi-processed pulps.

Majority of products of agricultural origin after food processing do not need cold-chain as logistics service, thanks to processes that include adding of preservative other ingredients, aseptic packing, etc.

Transformed product is maintained in preserved condition to hold and retail inventory
Multiple series of processes to transform farm produce into food items - pickles, juices, jams, sauces, pulps, ready-to-eat/cook - finished products.

Use vehicles, rail, containers and ships for transporting products – may not be cold-chain.

Warehouses for storage of finished food products – may not need to be refrigerated storage.

Activities related to converting raw produce into finished product at a captive factory location.

Activities to assure Technical and Quality parameters to safeguard product hygiene, labelling, etc.

Food Processing units can transform would-be-waste into consumer food items, creating value. Cold-chain is not always necessary for a majority of Manufactured food items.
Understanding a key difference

- **Cold-chain** is a logistics chain, governed by related norms, rules, regulations.
- Fresh farm produce requires packaging for safe logistics and adds to traceability.
- Food Processing undertakes a transformative industrial activity, governed by norms, rules, tax regulations related to manufacturing. Best served by extracting value from culled produce.
- Processed products require packaging with special labelling to list ingredients used and provide an expiry date.
- Most processed food items do not need cold-chain as a connect to market.
Why cold-chain?

- For fresh whole harvest, it **Extends saleable life**; Buys time to reach hands of more consumers
- A technical intervention that empowers farmers, choice to select multiple market destinations. Custodian of value created by farmer
- For modified/processed food, it **Preserves status of manufactured product** till consumption. Custodian of value created by factory
- It Safeguards produce quality and nutrient value
- It incorporates compliance with traceability norms
- It brings Agribusiness to farm gate through market linkages
- Promotes consolidation of operations at farm-gate to counter low land holding pattern

Cold-chain is distinctly about connectivity with consumers, and hence must be primarily market linked
User segments in cold-chain

- Fresh Horticulture
- Fresh Floriculture
- Milk, Ice Cream, Butter
- Fresh Meats/Fish/Poultry
- Some Processed Food Products
- Pharma, Life Sciences, chemicals, electronics

**Policy Beneficiaries (Direct)**

- Farmers, Growers, Retailers
- Traders / Manufacturers / Industrialists

Policy should look to prioritise among user segments - to develop as thrust area
Agenda Cold-chain

★ OBJECTIVE
- Reduce Loss incurred on perishable produce

★ WHY
- Improve value realisation for farmers
- Optimise resource utilisation of nation
- Stabilise Prices to consumers

★ HOW
- Maximise the reach of produce to markets
- Use technology as a supply chain intervention
- Optimise would-be-waste from perishables
## Major Components of cold-chain

<table>
<thead>
<tr>
<th>Name</th>
<th>Activity &amp; Description</th>
<th>Primary location</th>
</tr>
</thead>
</table>
| Modern Pack-house  | • Sort (segregate as per market)  
• Grade (sizing for market linked packaging)  
• Precool and stage for transit          | Fresh produce only – **farm gate**, for packaged shipment |
| Transport          | • Refrigerated haulage to buyers  
• Temperature and environment control  | Fresh produce – farm **pack-house to buyer** |
| Cold hub           | • Distribution design to cold store  
• Transient storage, pending retail     | Close to market at **Front end**       |
| Cold bulk store    | • Long term cold warehousing  
• Pending buyer or captive with owner   | **Farm gate** and/or **Food processor** |
| Ripening units     | • Compress shelf life for consumption  
• Climacteric fruits for fresh produce only | Close to market at **Front end**       |
| Transport          | • Retail distribution transport                                                  | **Inner city** or short run            |
| Retail             | • Point of sale or consumption                                                     | Last mile **front end**                |
| Allied equipment   | • IQF (Individually Quick Freezing machines)  
• Pulping, dicing, pulping, cooking     |                                        |
## Status of major components

<table>
<thead>
<tr>
<th>Name</th>
<th>Numbers / Capacity</th>
<th>Primary usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modern Pack-house*</td>
<td>• Minimal, estimated less than 200</td>
<td>Export locations</td>
</tr>
<tr>
<td></td>
<td>• Avg output of approx. 25 to 50 tons a day</td>
<td></td>
</tr>
<tr>
<td>Transport*</td>
<td>• Minimal, estimated 8000 reefer trucks</td>
<td>Across the country</td>
</tr>
<tr>
<td></td>
<td>• Negligible reefer containers for rail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Approx. 30,000 insulated but non-refrigerated primarily for milk movement.</td>
<td></td>
</tr>
<tr>
<td>Cold hub</td>
<td>• Approximately 5 million tons a capacity</td>
<td>Across country</td>
</tr>
<tr>
<td>Cold bulk store</td>
<td>• Approximately 26 million tons primarily for spices and potatoes</td>
<td>Farm gate and/or Food processor</td>
</tr>
<tr>
<td>Ripening units*</td>
<td>• Recent initiative, estimated 450 units</td>
<td>Front end</td>
</tr>
</tbody>
</table>

With an estimated installed capacity of 31 million tons in cold storages, India has a miniscule capacity in modern cold-chain pack-houses, which disallows our farm produce from entering the cold-chain.

France has 5 million tons of cold storage capacity with 1,40,000 refrigerated truck. India has less than 10,000 refrigerated trucks, causing a major breach of the cold-chain – there is in effect no integration.
Cold-chain for Perishables

- Are we Barking up the wrong Tree?
- Can we reduce loss (of perishable crops) by building millions of tons of cold storage?
- Is high subsidy coercing the use of non-viable technology, skipping viable business models?
- Why are we missing the Logistics interplay needed for an integrated Supply Chain?
- Will creating static infrastructure solve the problem - is cold-chain worthwhile without direct marketing & transaction changes?
- Clarity on fiscal (ST/ET/BCD exemptions) benefits
Cold-chain must have an Originating point, where the produce is readied to enter a new environment –

- **Modern pack-house** with pre-coolers and staging cold room as source points – the major **MISSING LINK**
- **Refrigerated Transport** by road, rail, waterways or air – a critical **WEAK LINK**
- **Cold Storages** to support the chain of supply as a hub of marketing – existing capacity is availed for imported perishables because of above MISSING source points
- Destination can also be food processing units, but packaging demands are post production and hence only collection points needed with captive stores at factory.

Cold-chain requires all tools to affect a chain of connectivity – Storage is not cold-chain.
Cold-chain Needs

- Reduce waste by inducting technology -
  - Use cold-chain to reach more consumers not to hold perishing inventory to time the market
  - Cold-chain as a new market intervention and not as a delaying tactic

- Develop more pack-houses and transport to connect farmers with markets.

- Clarity to stakeholders & beneficiaries on policy by unifying norms and segregating focus areas.

- Develop a National Policy on cold-chain.
If we target to 25% of non-potato cold storage, existing capacity (i.e. cater to 2 million tons in storage capacity)
- create modern pack-houses with reefer trucks to develop a throughput of 2 million tons per day of perishables from rural source points.

20,000 pack-house units (on average, 1 for every 30 villages)
2 reefer trucks per pack-house (serving 48 hour round trip)

Fresh thinking and Investment is needed for these two missing links: Rs 48,000 crores

One modern pack-house with a pre-cooler and staging cold room is with estimate to handle 15 tons output a day for 6 months, in cachement that generates 35-50 tons/day.
Typical Flow from Pack-House

1. Harvest Cachement
   - 50 ton / day harvest

2. Cold-chain Pack House
   - <1 ton / day
   - 5 ton / day
   - 15 ton / day

3. Food Processing
   - Preserves
   - Juices
   - Mixes
   - Jams
   - Jellies
   - IQF

4. Export Gateway

5. Cold Storage - Market access
   - Ready to retail packages - cold-chain
   - Retail

6. Local Consumers / Mandi
   - Existing Multilayered chain
   - 25 ton / day

7. Non-Food
   - Compost
   - Farm Feed
   - Bio-gas
   - Dyes

Each end point is a revenue source
What is to be done

- Identify production of crops by districts.
- Identify existing demand at markets.
- Create a matrix of cold-chain as the tools of the trade (time-distance metrics per crop).
- No cold-chain for markets within 24 hour radius. Cold-chain intervention for volumes covering larger than 24 hour range.
- Selective support only for bulk storage targeting seasonal arbitrage.
- Push integration as a target – throughput must match source point and transport in projects.
### Horticulture Examples

<table>
<thead>
<tr>
<th>Name</th>
<th>Cold-chain</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>CS-PH-T-CH</td>
<td>Culled – juice, fillings</td>
</tr>
<tr>
<td>Grapes</td>
<td>PH-T-CH</td>
<td>Special Wine crop</td>
</tr>
<tr>
<td>Banana</td>
<td>PH-T-CH-RC</td>
<td>Culled and special crop - chips</td>
</tr>
<tr>
<td>Mango</td>
<td>PH-T-CH-RC</td>
<td>Culled, surplus – juice, dried</td>
</tr>
<tr>
<td>Litchi</td>
<td>PH-T-CH</td>
<td>Culled, surplus – canned, juice</td>
</tr>
<tr>
<td>Potato</td>
<td>CS</td>
<td>Special crop – chips, fries</td>
</tr>
<tr>
<td>Tomato</td>
<td>PH-T-CH</td>
<td>Special crop – juice, sauces</td>
</tr>
<tr>
<td>Eggplant</td>
<td>PH-T-CH</td>
<td>Limited – chips , IQF</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>PH-T-CH</td>
<td>Limited – IQF</td>
</tr>
<tr>
<td>Papaya</td>
<td>PH-T-CH-RC</td>
<td>Limited – juice</td>
</tr>
<tr>
<td>NE Fruits</td>
<td>PH-T-CH</td>
<td>Culled, surplus – wine, canned</td>
</tr>
</tbody>
</table>

*Indicative List - Index*

CS – Bulk cold store  
PH – Pack-house  
T – Reefer Transport  
CH – Cold store Hub  
RC – Ripening chamber

Creating food processing units linked with pack-houses will add viability and create a consumption point for the fresh produce. Hence a pack-house will target fresh market and divert non-saleable to processing line.
Understanding the need

**Fresh Potato** – only cold warehousing needed - almost 18 million tons capacity exists. Federation of Cold Storage Associations of India already appealing to stop subsidy due to excess capacity.

- Cold storage located at farm-gate, product cannot be pre-cooled but is brought down slowly by 0.5° to 1°C per day.
- Product is warmed up before onward logistics to market.
- New capacity needed in tandem with new initiatives to develop new production areas.

**Processed Potato** – specialised crop, driven by processing industry basis processing capacity.

- Raw potato contracted in advance for feeding production line.
- Well marketed and well documented consumer good with large multinational players already partaking.
- Requires bulk frozen cold stores in case of french fries.
- Requires ordinary warehouse in case of ready to eat chips.
Understanding the need

**Fresh Tomato** – complete farm to fork chain needed. Shelf life of a 1-2 weeks, no long term storage
- Packing, pre-cooling and dispatch facilities at farm-gate. Moves in ready to retail market lots.
- Pass-through cold storage hubs close to cities.
- Can use ripening chambers depending on demand.
- Perennial only in Maharashtra and Tamil Nadu.

**Processed Tomato** – specialised cultivar on contract, demand driven by processing line capacity
- Raw product harvested ripe on demand, is not packaged and not precooled but fed to production line.
- Culled produce from fresh potato variant can be added in small lots to tomato puree, ketchup etc.
- Product (ketchup, sauces, canned) need not use cold-chain.
- Large industrial houses, documented and developed industry.
Understanding the need

**Whole Onion (cured)** – hardy crop with normal shelf life of a 2-4 weeks. For 3-5 month storage cold storage used

- Lasts in ambient well ventilated storage.
- Is not pre-cooled once cured. Is not transported in cold-chain. Fresh green onion needs full cold-chain.
- Very few cold stores developed for onion storage.

**Processed Onion** – Domestic demand not tested

- Freeze dried or powdered.
- Lasts more than a year.
- Does not require cold-chain but production line
- Commonly exported, can help stabilise domestic price
Understanding the need

Other Crops – full cold-chain required

**SHORT LIFE** – Greens/leafy, Mango, Litchi, Pineapple, Peaches, Plums, Sharifa, Grapes, Banana, Brinjal, Okra, Cauliflower, Cherries, Berries, etc. – 2 to 5 weeks: Focus to develop connectivity (modern packhouses and reefer transport) and transactions (APMC, branding). Sell much before expiry of life.

**LONG LIFE** – Apples, Pears, Kiwi, Oranges, Carrot, Cabbage, 12 to 25 weeks – Focus to sustain the supply with a strategic buffer maintain in lean months. Not store full volume to sell later (hoarding).
Whole Foods (Farm Produce)

- All fresh Fruits
- All fresh Vegetables
- Seaweed (marine vegetables)
- Raw milk
- Eggs
- Unprocessed meat without additives
- Fish and shellfish without additives
- Nuts and seeds
- Whole grains
- Beans and other legumes

- Chilled, mild chill range (0° to 20°C)
- Chilled, mild chill range (0° to 20°C)
- Frozen (< -18°C) or Chilled range

Whole Food: those which are a produce of nature than a product of industry. Majority require cold-chain and the surplus can also be processed into other food forms.

- Unprocessed and unrefined
- No added ingredients, No additives: nothing has been mixed in, cooked in, baked in, sprinkled on, or injected
- Not in boxes, bags, jars, or cans
- Is produced and harvested by farmers
- Have a natural metabolic physiology and will eventually perish in natural state.

Not needing cold-chain, but can benefit from temperature controlled storage
- Whole grains
- Beans and legumes
- Nuts & seeds

Cold-chain required for
- All others
Processed Foods (Transformed Products)

- **Processed fats and oils**
  - Refined oils
  - Cooking spray
  - Margarine
  - Salad dressing
  - Mayonnaise
  - Peanut butter
- **Beverages**
  - Soft drinks
  - Fruit drinks
  - Instant / Mixed drinks
  - Wines, Spirits
- **Baked goods and grains**
  - White rice
  - Cornmeal
  - Flours / Dough / Breads
  - Rolls / Buns
  - Muffins / Bagels
  - Bread sticks
  - Pita bread
  - Chapatti / Tortillas
  - Biscuits / Crackers / Cookies
  - Macaroni / Pasta
  - Cake and Cake mixes
  - Flakes, Krispies, mixes
- **Salt and leavens**
  - Salt / Baking powder / soda
- **Convenience foods**
  - Breakfast cereal
  - Energy bars
  - Pizza
  - Precooked foods
  - Frozen dinners
- **Confections**
  - White sugar
  - Brown sugar
  - Corn syrup
  - Rice syrup
  - Honey (unless raw)
  - Syrups
  - Candies / Gum
  - Pudding
  - Dessert mixes
  - Frozen desserts
  - Whipped creams
  - Chocolates
  - Marshmallows
  - Shredded coconut
  - Jaggery / Sugar substitutes
- **Processed fruits**
  - Canned fruit
  - Fruit sauces
  - Jellies / Jams
  - Pie fillings
  - Fruit juice
  - Dried fruits / prunes
  - Pickled fruit
  - Frozen diced fruit
- **Processed vegetables**
  - Canned vegetables
  - French fries
  - Chips, Snacks
  - Sauces
  - Ketchup / Mustard
  - Purees
  - Dried vegetables
  - Pickled vegetables
  - Frozen diced veggies
- **Processed dairy**
  - Cheese / Paneer
  - Yogurt / Curd
  - Ice creams
  - Milk other than raw (homogenized, UHT, skim, low-fat, etc.)
- **Processed meat**
  - Canned meats
  - Cured salted meats
  - Gelatin
  - Fish/Poultry/Meat nuggets
  - Reclaimed meats / sausages
  - Cold cuts / Ham / Bacon
  - Fresh meats with additives

Non cold-chain products
- Sun dried products
- Dehydrated foods
- Roasted foods
- Canned foods
- Pickle / salt preserves
- Jams, preserves, jellies
- Ready to Eat foods
- Milled products
- Semi processed mixes
- Oils and extracts

Few cold-chain products
- Frozen F&V
- Dairy, Some meats
- Certain confections
Scope to Rationalise support

- Incentivise and drive objectives rather than only feed static infrastructure creation.... Measure in throughputs achieved, not in space created!
- High Subsidy viewed as easy funding for asset creation, instead of incentivising business models....
- Subsidy as a fund tending to inflate price of infrastructure, not promoting diligent practices in business...
- Subsidy be used as incentive for technology induction, compliance and for business support, not to establish non viable assets....
Clarity & classify the support

- Create a list of products and the co-relation to cold-chain.
- Uniform support to cold-chain components from all agencies.
- Separate norms for items specific to production line or special needs for export.
- Leverage budgetary support to help develop marketing or spearhead first time connectivity with markets.
- Time-volume limitation to all project specific support.
**Summation**

- Invest in relevant PHM infrastructure at farmgate – currently domestic produce does not enter cold-chain. To justify existing cold stores as platforms in cold-chain, require invest Rs 48k crores in villages.

- Place targets in market throughput not cold storage holding capacity. More cold stores will not solve problem.

- Link cold-chain to support market reforms, focus on direct marketing.

- Build perishable gateways at seaports to open export opportunity.

- Align small food processing units with new pack-house developments.
Current cold-chain scenario by Sector

- Dairy: 75%
- Fish: 75%
- Pharma: 75%
- Meat: 50%
- Confectionery: 50%
- Poultry: 40%
- Fruit & Vegetables: <10%
  
  (including potato)

All Processed Food types that need cold-chain: Ice cream, fresh cut meats, frozen food, chocolates, semi-processed pulps, etc., already use cold-chain logistics as an intrinsic requirement. Such use by industries is estimated to account for less than 5% of total Horticulture production- in effect, cold-chain benefits are not reaching the farmers/producers of perishable goods which is what needs to be developed to reduce loss of perishables.

Source: NHB (data estimated, not validated by NCCD)
Thank you

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