Strengthening India’s Cold-chain

“Identifying the Gaps”

An autonomous body to serve as a Think-tank on Cold-chain & Agrilogistics matters.
Established to function in PPP mode, to guide policy interventions and disseminate knowledge on the perishables supply chain.
Policy makers felt the need for holistic & domain specific knowledge, without any bias, to help set direction.
World’s largest footprint in cold stores
- 134 million mtrs$^3$ in refrigerated storage (33 mill tons)
  - USA has 115 and China 70 million cub. metres of refrigerated space.

Food loss remained high in the supply chain
- FAO HLPE of 2014 reported 126 kg FLW per capita per annum
- Industry reports indicated 30-40% production lost

Urbanisation high, population keen for high value foods
- Imports of fresh produce grew 15 to 30 times in 10 years
- Market grows for health conscious viz price conscious

Farmers socio-economic growth partial
- Production levels high, productivity going waste
- Farmers market access and range limited
Cold-chain: past assessments

- As per NSEL Report (2010)
  - Cold-chain requirement = 61.13 mMT
  - Existing cold-chain capacity = 24.29 mMT
  - Infrastructure gap = 36.83 mMT

- As per ASSOCHAM Report (2012)
  - Existing capacity = 30.11 mMT
  - Additional requirement = 36.83 mMT

- As per Emerson Climate Report (2013)
  - Existing capacity = 30.11 mMT
  - Infrastructure gap = 31.02 mMT

- As per YES Bank Report (2014)
  - Added Cold Stores required = 30.98 mMT

Each report snowballed from previous, w/o demand baseline
Food Loss

When harvested produce escapes its end use!

How does our food escape?

• By perishing before it can reach gainful use!
• Because markets are too inaccessible!

Why are markets inaccessible?

• Because food is perishable and needs post-harvest care!
• Because Post-harvest care is not market linked!
• Because such Care requires working tools!
• Because such Tools require skills to use!
• Because some stakeholders do not care!
Strategic direction

**OBJECTIVE**
Reduce Loss incurred on perishable produce

**WHY**
- Improve value realisation, *Income security to farmers*
- Optimise the Nation’s *Resource Utilisation*
- Give producers & consumers *Stabilised Prices*

**HOW**
- Maximise the reach of produce to markets
- Supply chain technology as an intervention
- Intelligent resource use, low environment impact

Development linked to consumers, aimed at “seamless farm to market” logistics, so as to efficiently transfer value as harvested, to consumption.
“All Food must be handled with one end-use in aim – for Consumption”
Redefine productivity to include market access and market reach.

**Gainful Productivity**

The holding life of produce is extended with cold-chain so that a longer presence on shelf or shelf life is possible, creating more opportunity to producers. Without cold-chain, the holding life is limited, thereby narrowing the range of accessible markets.

**Shelf life is not to be confused with total Holding Life**
“Shelf Life is time spent on Shelves and at Homes”

Supply chain a prime objective - to expand reach, open markets
Throughput based measures as per product category is used. Considering size alone, will only sanction unwanted cost and capacity overruns.
# Cold-chain Product Protocols

<table>
<thead>
<tr>
<th>#</th>
<th>Products</th>
<th>Logistics Flow (in order of components)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Apple</td>
<td>CS – PH – T – CH - t - FE</td>
</tr>
<tr>
<td>2</td>
<td>Grapes</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>3</td>
<td>Orange</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>4</td>
<td>Strawberry</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>5</td>
<td>Kiwi</td>
<td>CS – PH – T – CH - t - FE</td>
</tr>
<tr>
<td>6</td>
<td>Potato</td>
<td>CS – Ts – FE</td>
</tr>
<tr>
<td>7</td>
<td>Tomato</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>8</td>
<td>Onion</td>
<td>SS – Ts – w – FE</td>
</tr>
<tr>
<td>9</td>
<td>Cauliflower</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>10</td>
<td>Okra</td>
<td>PH – T – CH - t - FE</td>
</tr>
<tr>
<td>11</td>
<td>Carrot</td>
<td>CS – PH – T – CH - t - FE</td>
</tr>
<tr>
<td>12</td>
<td>Cabbage</td>
<td>CS – PH – T – CH - t - FE</td>
</tr>
<tr>
<td>13</td>
<td>Mango</td>
<td>PH – T – CH – RC - t - FE</td>
</tr>
<tr>
<td>14</td>
<td>Banana</td>
<td>PH – T – CH – RC - t - FE</td>
</tr>
<tr>
<td>15</td>
<td>Papaya</td>
<td>PH – T – CH – RC - t - FE</td>
</tr>
<tr>
<td>16</td>
<td>Processed products*</td>
<td>PU – T(s) – CH (w) - t - FE</td>
</tr>
<tr>
<td>17</td>
<td>Meat &amp; meat products</td>
<td>PU – T – CH - t - FE</td>
</tr>
<tr>
<td>18</td>
<td>Dairy products (cream, Butter)</td>
<td>PU – T – CH - t - FE</td>
</tr>
</tbody>
</table>

**Legend:**
- PH - Modern Pack-house; T - Long Haul Reefer Transport; Ts - Non-reefer Transport;
- CS - Cold Store Bulk; CH - Cold Store Hub; RC - Ripening Chamber; FE - Front-end merchandising;
- SS - Storage Structure; PU - Food Processing Unit or Allied; t - last mile Transport; w - warehousing

- **Component definitions** used and related to the existing schemes and system standards.
- **Logistics aspects of flow, throughput capacity and holding size to be correlated with demand.**

NCCD.2015 All India Cold-chain Infrastructure Capacity (Assessment of Status & Gap), Delhi
Pack-house is the Nerve Centre

Post Harvest supply lines

Harvest Cachement
- 50 ton / day harvest

Cold-chain Pack House
- <1 ton / day
- 5 ton / day

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

Local Consumers / Mandi
- Existing Multilayered chain

Cold Storage - Market access
- Ready to retail produce - cold-chain

Retail

Distant Consumer

Each end point brings gainful end-use
A changed approach

Demand Driven Study (*consumption linked*)

- Infrastructure studied as a tool to deliver food.
- Domain specific segmentation of components.
- Requirements assessed for purpose of connectivity.
- Logistics chain evaluated, working backwards from consumption – taking an Inverse approach.
- Holistic development so as to complete the value chain system- to function as a bridge from rural producing areas to urban centres.

...Gainful Productivity the target...
Income security for farmers as the outcome

Focus on reducing Loss in the farm-to-consumer supply chain
Infrastructure assessment on realistic consumption patterns, not notional needs
Domain specific appraisal

Supply Side

- Tons per batch precooling + small cold room
- Modern Pack-houses
- Farm-gate

Load capacity per trip

Right sizing Capacity and Investments

Cold Store Distribution Hubs

- Handling size weekly/annum

Storage space per annum

Food Processors

Cold Store Bulk Warehouses
- Buffer for Supply

Reefer Transport

Daily tons per unit

Ripening Units

Merchandising Platform

Daily tons per unit

Multi-product Multi Temperature Multi Chamber Multi-technology

VOLUMETRIC THROUGHPUT is a common metric.
Currently, the majority of infrastructure is in the form of Potato-based bulk cold stores. Currently, 75% capacity utilization as per NHB survey.

Produce from one State finds capacity in neighboring States.

The gap is large in case of pre-cooling at pack-houses, transport connectivity, and ripening chambers.

Mission is to develop integrated and synergistic infrastructure components, so that farmers and consumers will gain from the supply chain.
Fresh produce is of delicate... treat with respect.

Supply chain must deliver to shelves & not merely hold inventory.
Buying time... Run far and fast for a Sale

Cold-chain is part of the agri-business logistics sector and is clearly understood as an enabling mechanism that connects producing areas with consumption centres. Cold-chain can have the greatest socio-economic impact when used as a logistics medium that empowers the farmers to directly connect with multiple markets, across geographies. Without facilitation of cold-chain, the average farmer of perishable produce has no counter to produce perishability and no other recourse but is constrained to selling off the harvested produce to the closest intermediary.

When you buy time through application of technology, use that time intelligently.

When dealing with perishables, use the extra time to advantage, by reaching a market that offers better value realisation.

Do not bide a sale, run for a sale.
Lost in translation – harmonise concept

Keep a delivery bias – not mere storage

Shelf life starts only when reaching shelves

Counter FLW to meet sustainability demands

Price and demand in NOT the problem – poor Application of Knowledge is!

Country must have a National Policy on Cold-chain – this cross geographical link cannot remain a State subject
Defining - Rationalising - Harmonising
Making the Cold-chain Smarter

Thank You

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