# Human Capital

*in*

## *Post Harvest Care*

## Initiating the Cold Chain


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## The Want for Trained Handlers

# TRAINING INDIA'S COLD CHAIN

Post Harvest Cold Chain Care for Agri-Produce

## FOOD SECTOR IN INDIA

**FACTS:**

- India produces 47 million tons of Fruit – largest producer in the world.
- India produces 96 million tons of Vegetables – 2nd in the world.
- Horticulture contributes for over 30% of Agri-GDP.
- Accounts for 41 million hectares of cultivated land
- Employs close to 150 million people.

**FUTURE & GROWTH:**

- Booming retail sector - trade in 2006 estimated at US$320 Billion
- Growth expected to US$ 421 Billion in 2010.
- Organised sector growth at 40-45% annually.
- Penetration of organised retailing up at 6% in 2006 from 3% in 2003.
- Capacity to increase penetration in exports and food processing.

It is inferred that demand for an efficient & modern supply chains for handling of fresh produce will grow significantly.

## EXISTING STATUS OF COLD CHAINS IN INDIA:

- Lack of integrated Cold Chain exists.
- Fragmented cold chain integrity with negligible pre-cooler availability.
- Pre-coolers and refrigerated transport still in an experimental stage.
- Process inefficiencies abound – lack of knowledge.
- Horticultural business model tutors evacuating produce daily to closest mandi.
- Grid Power failures effect fresh produce shelf life.

Yet countries in a similar state of development & facing similar issues have overcome and transformed themselves into strong horticulture trading economies – Thailand, Peru, Chile, etc.

India's **Compelling Strengths**:

- Horticultural biodiversity.
- India is one of the largest producers of Fruits and Vegetables.
- Large Agrarian work force.

Realities, **Weaknesses**:

- F&V is inherently fragile, prone to damage easily.
- Cultivation of F&V regional, cold chain transportation inevitable.
- Inefficient management of F&V sector.
- Fragmented and small farm holdings.
- Low level awareness of best practices in post harvest technology.

- Low awareness of best practices in cold chain management.

**Paradigm Shift** Essential:

- Promote awareness of best practices & global benchmarks in Post Harvest care.
- Improve F&V handling practices- post harvest & in transportation.
- Develop a strong efficient cold chain supply system.
- Speed up adoption of cold chain system.

## EXECUTIVE SUMMARY

**Drivers** for **demand** for Cold Chain infrastructure:

- To Fully leverage strengths.
- Rapid growth of modern format organized retailing.
- Obsolete or defunct existing installations.

**Bottlenecks** Existing:

- Nascent, Limited knowledge, limited experience.
- High capital costs.
- Limited Power supply.
- High Power costs – energy intensive industry.
- Poor awareness of benefits of pre-cooling amongst farmers.
- Prohibitive lead time from adoption to benefits.

**Strategy** to **Mitigate**:

1. **Reduce Cost** burdens, Advance Viability -
    - Adopt alternate cold chain options.
    - Utilise Passive cooling options that store thermal energy.
    - Utilise existing transport systems to reduce capex burden.
    - Utilise a hybrid and practical cold-chain system.
    - Enhance the Support Structure:
        1. Create a **Knowledge** Cadre
        2. Utilise and drive towards Innovative Power Solutions

## OPTIMAL FRUIT & VEGETABLE CARE

- All Fruit and Vegetables must be pre-cooled to designated carriage (storage) temperatures to obtain maximum shelf life for energy utilised.
- As most plants compromise differing species, their physiological and metabolic activities greatly differ.
- This **variety** makes the cold chain and its **optimal utilisation** a very technical and **skilled industry**.

## LIMITED KNOWLEDGE BASE (India-centric):

- Lack of **Domain Skills** – limited knowledge resources.
- No access to **trained knowledge base** – specific to F&V care.
- No access to trained technical skills – **sustaining** specific **cold chain links.**
- No specialized institutes for cold chain technicians – **on the job training.**

- No central body of knowledge on good cold chain practices.
- Minimal linkages exist with foreign knowledge centres.
- Minimal tapping of Experienced operators working in foreign set-ups.

- Hands on experience and sharing of knowledge base reduces the viability gap.

## LACK OF HUMAN CAPITAL

A **Key Gap** in cold chain space is lack of adequate & relevant **human capital** to manage and operate the cold chain systems.

- Cold chain involves a complex chain of activities.
- Multiple complexities in human capital development. Cold chain expertise & Skilled manpower -
  - Operators and managers.
  - Technicians and Maintenance engineers.
  - Cold chain Logistics & Transport.
  - Agri-experts.
  - HACCP compliance.

Two issues need to be addressed-

- A lack of a steady stream of skilled people who manage various aspects of cold chain.
- A disconnect between desired skill-sets and academic curriculum.

Ensuring a steady stream of skilled manpower:

- **Technical Cadre** – Engineers and technicians, who can install, commission, maintain and maximise the various equipment required in the cold chain.
- **Knowledge Cadre** – a cadre who will take decisions on appropriate climate control and handling for various fruits & vegetables; to enable the farmer to extract maximum realisation from any unit of produce.

## EXISTING KNOWLEDGE SHARING

- Disconnected from Operators-
  - Various initiatives taken in participation with foreign organisations and business participants – focussed on academic or on material vestments.
  - Seminars by academic luminaries not equivalent to training and awareness programs at grass root level.
  - Seminars attended by senior management and leadership level from industry. No pass through to operator level.
  - Cold Chain and its linkages function efficiently only when the trained operators exist. No focus (as no integrated cold-chain cadre) in current training curriculum to create such an operator base.

- Disconnected from India's Farming patterns -
  - As cold chain is currently the domain of business makers, the focus is on equipment and machinery.
  - The chosen systems are inherited from nations with differing ground realities, disconnected from India's agri-practises.

- The economic learnings on the cold chain from non-Indian sources focuses on large volume yields... leading to injudicious choices of equipment and machinery.
- Flexible designs of cold chain infrastructure will allow full utility given diverse produce cachement and flexible work force. Yet focus remains on large rigid designs as marketed by companies.
- The operational and handling practises for perishable produce does not factor in the fragmented yield lots that will be handled in Indian cold chain establishments at farm gate stage.
- India would benefit from a move from mass storage to direct-access storage, yet there is minimal focus on this option – most thought is focussed on traditionally understood concepts on cold-chain.

- Disconnected from India's Human backdrop-
  - The largest disconnect exists in ignoring the awareness and training gap. Untrained application of the cold chain creates greater losses.
  - The viability gap and the seminars addressing it focus largely on the power factor. Untrained utilisation adds to power wastage.
  - Operating errors lead to shrinkage, wastage, damage and all these occur after energy application and thereby translates into gross energy loss.

## BENEFITS FROM TRAINING

Any Training and Awareness program brings about improvement of knowledge and skill set, enhances the output, quality and productivity, and increases commitment leading to growth and prosperity. How does this translate specifically in the nascent cold-chain industry in India? We must keep in mind, any efficient cold-chain begins at the production and collection centre – the critical Farm Gate. This means that in India, the training must initiate at the rural level; at the first post harvest link to cold chain; the operating and handling level-

- Enhanced aware feedback and improved interaction levels from farm-gate leading to further refining of procedures and policy formulation.
- Trained users will result in Participative guidelines instead of imposing policies.
- Standardisation, Improved handling and minimising of conflicts.
- Improved Food Quality - segregated utilisation, no tainting, no rotting.
- Improved Food Safety – protecting consumer health and compliance with national policy objectives.
- Training allows for intelligent Operational flexibility.
- Understanding Promotes Innovation at grass root level.
- Improved planning, forecasting and outbound management.
- Improved contingency responses minimising operational losses.
- Reduced energy consumption; Reduced environmental impact.
- Greater awareness translates into first level quality checks and energy is not wasted on unsuitable produce.
- Increased Operational efficiency, reducing the viability gap, adding to profits.
- Visible manifestation of concept spread and heightened palpable anticipation.

## EXAMPLES

- Due to fragmented farm holdings, produce arrives in small lots. For energy considerations, is the pre-cooling to be delayed for a full energy load? Does the facility allow flexibility to operator?
- The facility is overloaded due to unexpected yield – the broken stowage is minimal in the cold room. When and how should fresh air be input before the produce starts to suffocate? Added fresh air will increase power requirement in an overloaded store – how to minimise this load?
- With efficient forecasting, a pull system is catered to – does the produce need any energy applied for the next 3 days?
- In the fresh perishables trade, the produce may be safer on the plant. Can communication save loss due to inefficient exposure?
- 60MT of produce is stored safely for past 4 days. A new lot of 5MT arrives at facility. How can this safely be stored without risking the previous 60MT? Is the facility designed to empower the operator to decide or is management intervention required?
- Safe carriage temperatures depend on the variety as well as the type of produce, and may also depend on growing area and on whether early, main, or late harvested produce is being carried. Also, it may be necessary to mix produce with slightly different temperature requirements. In what case which is the correct choice of temperature to keep?
- My cold chain is state of art, yet continues to suffers losses. Is the produce compatibility correct, has the sanitisation procedure been followed, is the air flow disturbed, are there any hot-pockets developed?
- My SOP declares a temperature to be set for optimal shelf life. But the produce is consumed in half the stated shelf time. How much can I reduce the energy load for this partial shelf life requirement?
- Very often, with cooling on the production site, followed by transport in an insulated, non-mechanically refrigerated vehicle, is sufficient for limiting temperature rises and for preserving the quality of the produce. When is this option to be considered? Won't the produce suffer thermal shock?
- How to maximise capacity utilisation without risking the produce; what air circulation system is required?
- What pre-trip inspections are required before taking on produce?
- What pre-shipment handling and packaging is suited?
- What is the cheapest way to recover energy form vent air and air freshening systems?
- With which innovations and for which produce types can breaks in refrigeration be acceptable?
- What are end of holding processes and how can it improve profits?
- The collection centre workers are not technically minded, what color coding system can be followed to prevent handling and storage errors?
- How do I reduce thermal load (heat ingress) into my facility?
- I've been told two products cause cross-contamination but I have run short of space. What steps are required to use the same space for both produce types?

## Teaching

- To Provide Knowledge in Theory and the Practice of general or specific Concepts.

## Training

- To Provide an understanding of Knowledge through sharing of Experience, thereby transforming it into real time application.