

Cold-chain Task-Force

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Meeting-1

**Harmonising the Concept
Development / Components / Users**

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Presentation Flow

Introduction Harmonising the concept	Slides 3 - 9
Cold-chain Objectives Components	Slides 10 - 11
Current Status of Cold-chain components	Slide 12
Reservations in future development	Slide 13
Missing Links and investment estimates	Slide 14 -16
Flow of produce in the cold-chain	Slide 17
What needs doing	Slide 18
Examples - Understanding the need	Slides 19 - 23
Categorise the products	Slides 24-25
Free fund, Subsidy or Incentive	Slide 26 - 27
Summation	Slide 28

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



Cold Chain

Environment-controlled logistics chain, uninterrupted from source-to-user, consisting of activities related to pre-conditioning, storage and distribution so that the inventory is maintained within predetermined ambient parameters.

Segments

Transportation

Uses refrigerated trucks, vans, containers, air, rail and ships for transporting perishable produce

Static Infrastructure

Consists of pre-conditioning units, refrigerated storage, distribution and retail of perishable products

Key Activity

Market linked Delivery

Activities related to connectivity—packing and distribution of produce to multiple markets

Quality Assurance

Care that assures Technical and Quality parameters to extend Holding Life and Saleability.

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

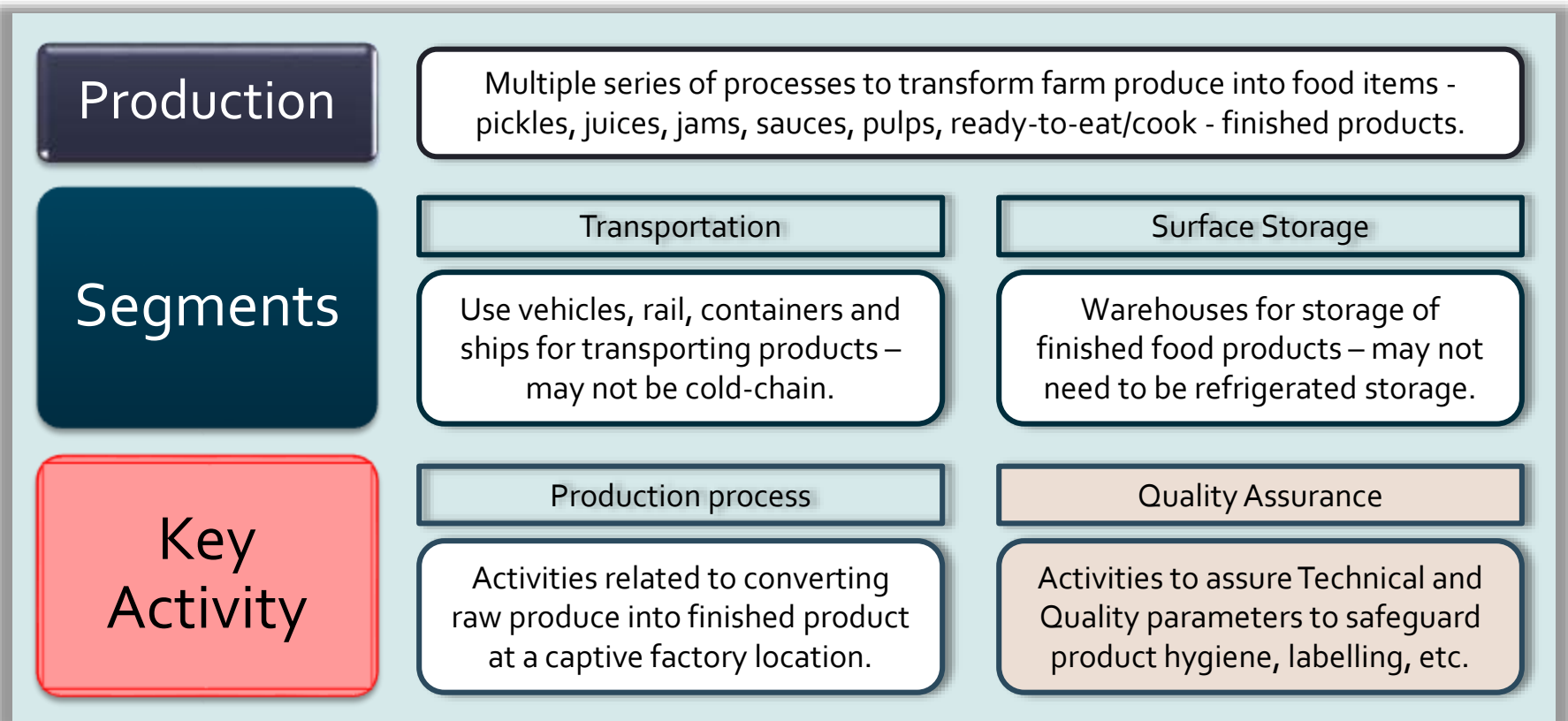
Cold-chain and processed food

- ❖ Food Processing (FP) is 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

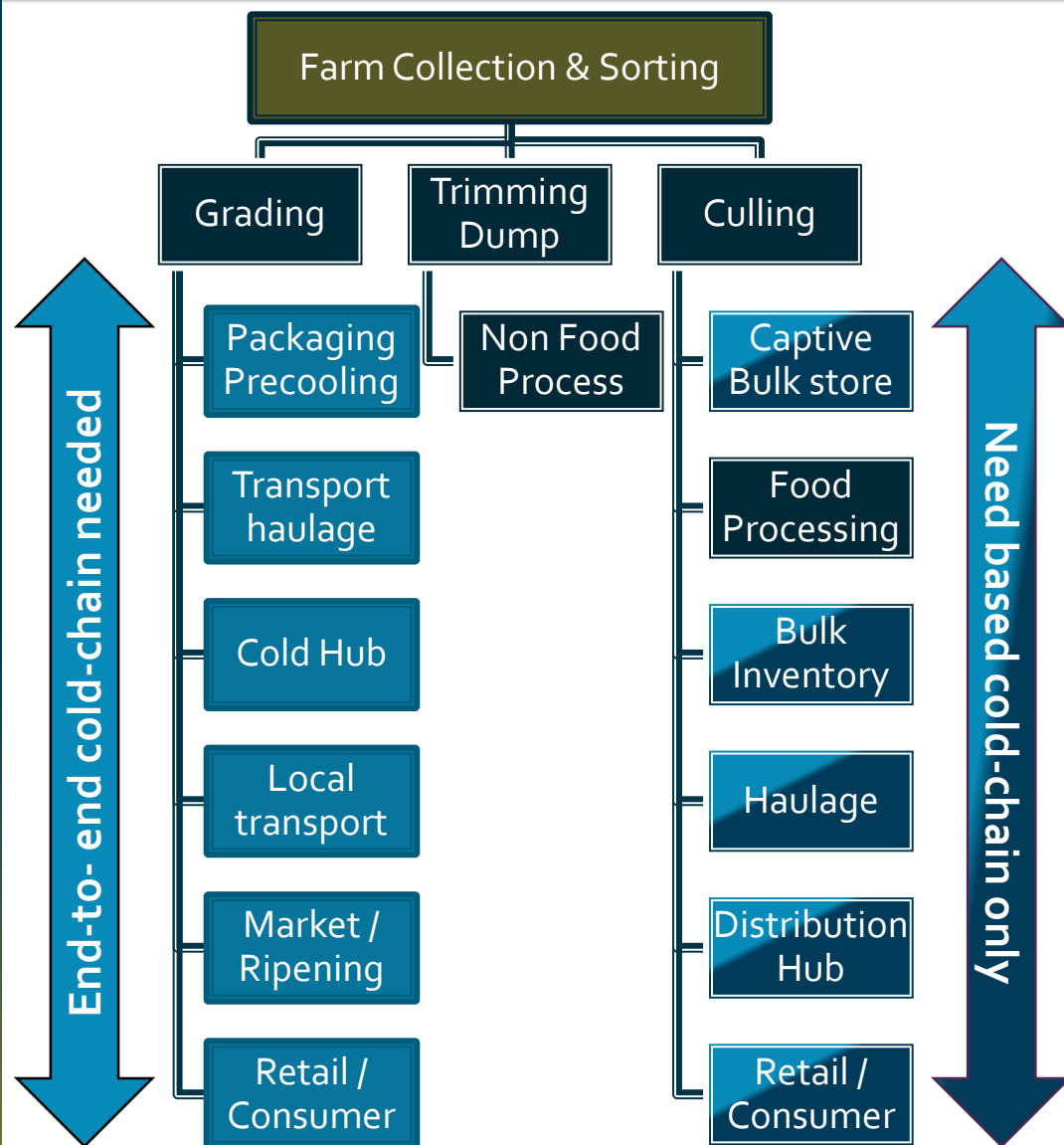
Food Processing – for Value Optimisation

6



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

Typical Flow - Cold-chain



For farmers Fresh Produce, caretakes farm value

For processed Food Product

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

9

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

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

Policy Beneficiaries (Direct)

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

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

Name	Activity & Description	Primary location
Modern Pack-house	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Refrigerated haulage to buyers Temperature and environment control 	Fresh produce – farm pack-house to buyer
Cold hub	<ul style="list-style-type: none"> Distribution design to cold store Transient storage, pending retail 	Close to market at Front end
Cold bulk store	<ul style="list-style-type: none"> Long term cold warehousing Pending buyer or captive with owner 	Farm gate and/or Food processor
Ripening units	<ul style="list-style-type: none"> Compress shelf life for consumption Climacteric fruits for fresh produce only 	Close to market at Front end
Transport	<ul style="list-style-type: none"> Retail distribution transport 	Inner city or short run
Retail	<ul style="list-style-type: none"> Point of sale or consumption 	Last mile front end
Allied equipment	<ul style="list-style-type: none"> IQF (Individually Quick Freezing machines) Pulping, dicing, pulping, cooking 	

Status of major components

Name	Numbers / Capacity	Primary usage
Modern Pack-house*	<ul style="list-style-type: none"> Minimal, estimated less than 200 Avg output of approx. 25 to 50 tons a day 	Export locations
Transport*	<ul style="list-style-type: none"> Minimal, estimated 8000 reefer trucks Negligible reefer containers for rail Approx. 30,000 insulated but non-refrigerated primarily for milk movement. 	Across the country
Cold hub	<ul style="list-style-type: none"> Approximately 5 million tons a capacity 	Across country
Cold bulk store	<ul style="list-style-type: none"> Approximately 26 million tons primarily for spices and potatoes 	Farm gate and/or Food processor
Ripening units*	<ul style="list-style-type: none"> Recent initiative, estimated 450 units 	Front end

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

Missing Links – perishable crops

- ❄️ 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.

Broad development estimates

- ❖ 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.

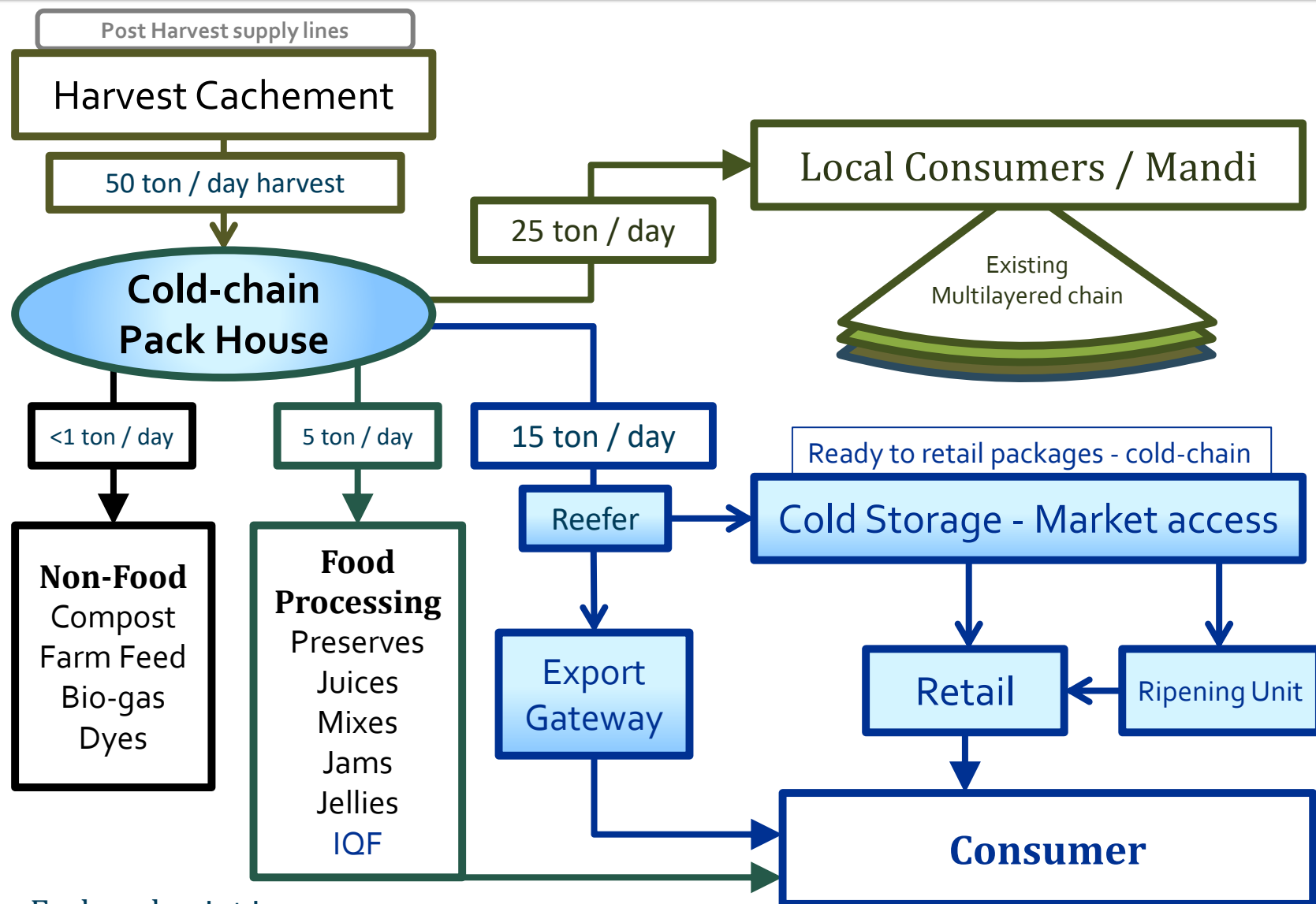
20,000 pack-house units (on average, 1 for every 30 villages)

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



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

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

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 - Chilled, mild chill range (0° to 20°C)
- ❖ All fresh Vegetables
- ❖ Seaweed (marine vegetables) - Chilled, mild chill range (0° to 20°C)
- ❖ Raw milk
- ❖ Eggs - Frozen (< -18°C) or Chilled range
- ❖ Unprocessed meat without additives
- ❖ Fish and shellfish without additives
- ❖ Nuts and seeds
- ❖ Whole grains
- ❖ Beans and other legumes

Not needing cold-chain, but can benefit from temperature controlled storage

- Whole grains
- Beans and legumes
- Nuts & seeds

Cold-chain required for

- All others

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.

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

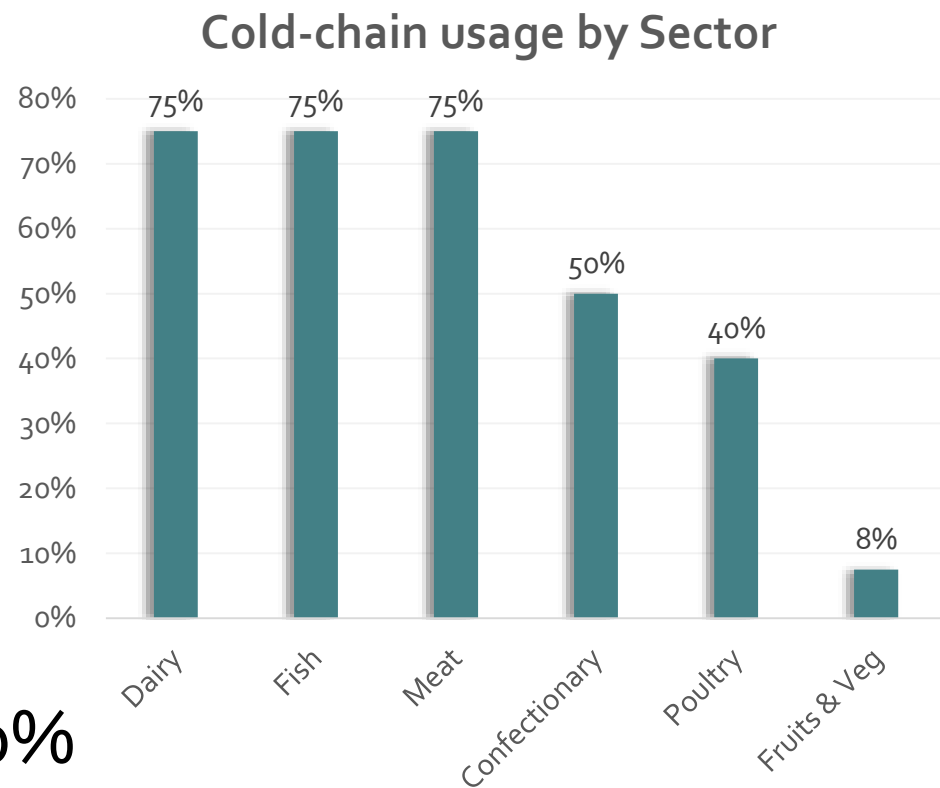
- ❖ Create a list of products and the co-relation to cold-chain.
- ❖ Uniform support to cold-chain components from all agencies.
- ❖ Separate norms for items specific to production line or special needs for export.
- ❖ Leverage budgetary support to help develop marketing or spearhead first time connectivity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

Thank you

End of Deck



National Centre for Cold-chain Development

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