

Strategy Document: discussion on Cold-chain Development

Infrastructure Status:

India has the world's largest footprint in refrigerated warehousing space – about 134 million cubic metres in volume. However, this capacity is primarily for bulk storage of certain crops, and not linked with other components to integrate the value chain system. These other requirements ranging from source to market include modern pack-houses, transport, cold store (Hubs), ripening chambers, etc. As example, the refrigerated transport capacity is reported to be less than 10,000 units. In comparison France with a storage of 15 million cubic metres has 140,000 reefer vehicles. Similarly, source points at farm-gate are not available for organised supply of produce, which requires integrated pack-houses (with pre-coolers and staging rooms). Large consumption demand from urban population provides opportunity to lead future development towards an “end-to-end” farms-to-fork connectivity.

Current support mechanism:

Support provided by the government agencies is represented as follows:

Central Sector Scheme	Capacity created (MT)	Projects	Assistance Rs. Lakhs	Remarks
NHB*	58,19,887	813	48003.5	35% - 50% subsidy, ceiling of Rs 7.5 cr
MoFPI	1,91,200	108	33699.3	50% - 75% subsidy, ceiling of Rs 10 cr
APEDA	53,556			25% subsidy, ceiling of Rs 10 lakhs
Centrally Sponsored (with State contribution)				
NHM*	45,72,389	776	54890.9	35% - 50% subsidy, ceiling of Rs 3.75 cr
PPP Scheme of DEA – NIL reported				

(in 7 years - XI plan and XII plan up to 31-03-2014)

*NHM and NHB are sub-schemes under the Mission for Integrated Development of Horticulture.

It is assumed that capacity supported is mainly in form of cold storage capacity with less than 5% capacity in other components. On average in capacity terms, NHB created 7158 tons per project, NHM created 5892 tons per project and MoFPI supported 1770 tons per project.

Recent Reports (2014 and 2015)

The **Task Force on Cold-chain Projects** (2014), recommended creation of 7.5 million tons in the next 5 years. After review of the findings of the Task Force, the PM's Office required that cold-chain management be treated as a part of second green revolution and gave clear direction for future strategy. It said that all implementing agencies were to change their approach and address cold-chain as “end-to-end” seamless connectivity from farm gate to consumers. An overall cold-chain capacity creation of 7.5 million tons was then targeted for the next 3 years.

To achieve target of 7.5 million tons of “end-to-end” handling capacity, it was initially recommended that the components be broken up as broadly represented below-

Component	Pack-houses	Reefer transport	Cold (Bulk) Store	Cold (Hub) Store
Unit size/capacity	16 ton	10 ton	5000 ton	1000 ton
Annual capacity	1,920 ton	520 ton	5,000 ton	52,000 ton
Numbers	1600	3200	50	50
Total capacity	3,072,000	1,664,000	250,000	2,600,000
Total cold-chain handling capacity			7.5 million tons	

Other capacity in form of ripening chambers, captive cold stores, retail units, etc., would comprise capacity in addition to above. To further detail the all India requirements a study was undertaken.

Thereafter, the study on **All India Cold-chain Infrastructure Capacity** (AICIC-2015) was commissioned by Ministry of Agriculture. This research was conducted by NCCD, using an inverse approach by linking infrastructure requirement to consumption patterns. The AICIC-2015 reported the realistic gaps in end-to-end connectivity from farm-to-consumer. Overall status of cold-chain infrastructure created and required is tabulated as follows:

As of 31-3-2014

Type of Infrastructure	Infrastructure Requirement (A)	Infrastructure Created (B)	All India Gap (A-B)	% share of Gap to Required
Pack-house	70,080 nos.	249 nos.	69,831 nos.	99.6%
Reefer Vehicles	61,826 nos.	9,000 nos.	52,826 nos.	85%
Cold Storage (Bulk)	341,64,411 MT	318,23,700 MT	32,76,962 MT	10%
Cold Storage (Hub)	9,36,251 MT			
Ripening Chamber	9,131 nos.	812 nos.	8,319 nos.	91%

-from study on All India Cold-chain Infrastructure Capacity

The gap reported is primarily at farm-gate in form of pack-houses along with the associated capacity in transport. The total cumulative capacity from the overall requirements is as follows-

Type of Infrastructure	All India Requirement	Unit Size (tons)	Operating Cycle	Handling capacity (mill tons/annum)	Explaining Remarks
Pack-house	70,080 nos.	16	120	134.5	Avg 4 months ops
Reefer Vehicles	61,826 nos.	10	52	32.2	Avg weekly turns
Cold Storage (Bulk)	6833 nos.	5000	1	34.1	Avg one full inventory
Cold Storage (Hub)	375 nos.	2500	40.5	37.9	Avg 10 days inventory
Ripening Chamber	9,131 nos.	10	300	6.8	Avg 300 days ops
Total capacity in million tons				245.7	All food items

To fulfil the recommendations of this study, the investment required is broadly assessed as below:

Item	Component	Requirement All India	Unit Cost Rs Lakhs	Investment Rs Crores	Remarks
1	Integrated Pack-houses (units)	70,000	95	66,339	For preconditioning 16 tons a day for cold-chain transit. Includes a pre-cooler and staging cold room with dispatch area for trucks. Facility will handle larger volume of incoming goods to segregate for non-refrigerated local market.
2	Reefer Transport (units)	62,000	30	15,848	Cost considered for 30 foot vehicles. Vehicle is insulated and refrigerated, capable of full range of temperature (-25 to +15 °C). Each vehicle to have a GPS and temperature/humidity data logging. Smaller vehicles will have lower costs.
3	Cold Store (Bulk) (units)	650	400	2,600	Cold store (Bulk) with large chambers for long term storing of certain produce, for periodic sale to markets over months. Average size of 5000 tons is considered.
4	Cold Store (Hub) (units)	360	350	1,260	Cold store (Hub) with chambers of less than 250 tons each with multiple docks and doors, racking and fork lift systems. Average size of 2500 tons is considered.
5	Ripening Chambers (units)	8,000	40	3,328	Ripening units with daily handling of 10 tons after a 4 day ripening cycle.
Total Investment				89,375	in Rs Crores

- Unit costs taken are as per the normative costs assessed under the MIDH guidelines.

- Additionally for modernising retail end in cold-chain (for fruits, vegetables, processed foods), an investment of Rs 10-15,000 crores can be estimated at last mile.

It is to be noted that full benefit of cold storage capacities as assessed in this study (namely at farm-gate bulk storage for long holding crops like Kiwi, Cabbage, Carrots, Apples) will require to be appropriated integrated with developing associated pack-houses and transport connectivity.

In case of the other short lived crops, pack-houses at farm gate and reefer transport units will suffice to enable access to cross regional markets. The wholesale markets will require cold storage hubs to receive and handle incoming goods. Alternately, cold hubs close to consumption centres can be designated as trading centres under State APMC or NAM network.

The study includes a chapter on definitions used and highlights some key concepts, namely, infrastructure size vs capacity, holding life vs shelf life, storage vs supply chain, and basic sequence of use for infrastructure. As a starting point it is clear that farm-level pack-houses and transport connectivity can be key to having a multiplier effect in horticulture growth

Status of support options by Government

1. **Subsidy driven capital investment:** In conceptual terms, the existing central sector and centrally supported subsidy programs are a form of Public Participation in Private development of the infrastructure items. This support has resulted in the major share of the capacities that have developed. These schemes have therefore been successful in contributing to the infrastructure development so far. Recent rationalisation of the guidelines has incorporated support for application of non-conventional energy, components that promote better handling practises and for automation/modernisation of aged infrastructure.

There exist key missing links in the cold-chain, for various horticulture crops. This can be attributed to an earlier under-developed market, lack of knowledge and awareness on what comprises holistic cold-chain, both at beneficiary level and implementing agencies.

2. **DEA's PPP scheme for capital investment:** The PPP scheme under Ministry of Finance is guided by the principle that the infrastructure developed is for public service, will be built on public land, will be guided by predetermined service tariff and will revert back to the public after concession period. There has been no successful implementation on records in the cold-chain sector, under the PPP Scheme.

The lack of participation in this scheme can be attributed to the fact that so far, most cold-chain projects were for cold stores; that average cost of each project is in the range of Rs. 2 to 8 crores only; that private land is used for such projects; that a tariff setting body does not exist; that promoters are hesitant to consider returning the asset and operations to government as it dilutes future capitalisation of the opportunity.

3. **Warehousing Infrastructure Fund:** a low interest credit window for access to Rs 5000 crore fund was launched under NABARD in 2014. The WIF is to support development of scientific warehousing, including all cold-chain infrastructure (cold stores, pack-houses, transport, etc.). For this purpose, RBI gave permission to NABARD to use the fund to issue loans to private sector also, besides institutional users. The low interest loan (at or close to NABARD PLR), effected a 2% to 3 % per annum interest subvention in comparison to loans from commercial banks.
4. **Other fiscal rebates/benefits:** Government of India provides other benefits to the cold-chain sector in form of capital investment linked tax deduction, service tax exemptions, excise duty and custom duty exemptions/rebates.

The central government's subsidy schemes, priority sector lending and the fiscal benefits have proven successful in driving cold-chain development. With normative costs and technical system standards, this development is strategically directed for efficient and green technologies, better practises and towards a future ready cold-chain.

Strategy for next level development

As a strategy, future development should focus more on designed handling capacity in contrast to static holding size. This will make use of funds directly linked to flow of produce rather than storage of produce. An example of handling vs holding capacity of airports or railway stations may be referred. This will require overcoming a mind-set change and resistance to such change.

Capacity building for key decision makers at State level and Centre level, in form of a national workshop by DAC is proposed. The workshop should focus on concept, funding options and bottlenecks at individual states. Action plans can then be developed by each State with value chain integration in focus.

Under the existing support mechanism, the following strategy is proposed-

- A. Continued government support for infrastructure creation with private sector involvement. This would require continuance of the existing support in form of low interest loan, capital subsidy and fiscal benefits.
- B. Capital linked subsidy is driven with State participation (Centrally Supported Schemes) and by agencies implementing Central Sector Scheme. This can be strategically revisited for faster implementation to meet targets. To promote cross-regional market connectivity, all cold-chain support could be considered under direct implementation of Central Govt.
- C. Central monitoring and harmonised recording and collation of data - a uniform metric of all new development for records and for monitoring of implementation.
- D. Service tax exemption in line with agriculture extension activities is recommended for cold-chain extension works. This will boost greater knowledge dissemination and capacity building on cold-chain (as end-to-end seamless connectivity from farms to fork), and bring more resources to focus on knowledge and skill development in cold-chain.

I. Implementation under PPP Scheme of DEA

DEA's PPP scheme is an opportunity to source project based funds for developing large scale infrastructure components. To comply with PPP Guidelines, the following is proposed:

- a. All mega food parks, designed to create common infrastructure for service to food processing units inside each park. Provision of public land to developers will ensure State participation in the food parks and help fulfil a criteria of the PPP scheme.
- b. The services to be provided by the common infrastructure (effluent treatment, power, cold-chain and distribution) in the mega food parks can be structured under a predetermined tariff (service fees, lease to tenants, maintenance fees). This will comply with a criteria of the PPP scheme.
- c. Similarly, proposals for multi-location pack-houses can be invited by central sector agencies, where preconditioning and transport services can be under a predetermined fees, as a service to farmers in the region. The land for building these pack-houses can be coordinated by State Government. Such projects with fixed tariff structure, can also be provided preferential power supply.

- d. PPP scheme can be taken up under the Annuity based model or the Viability Gap Fund (VGF) based model, depending on developer's options.

II. Implementation through State government

The State-wise capacity gaps assessed for individual infrastructure components are shared with each State. Copies of the AICIC-2015 study have been distributed to all State Governments (Chief Secretary, Principal Secy, Nodal Officer for Cold-chain Development and Mission Directors).

Each State, depending on crop/cultivar to be targeted, should accordingly list the appropriate infrastructure components required. To identify the crop for cold-chain intervention the following factors may be understood:

- a. A pack-house should preferably have access to harvest quantity equivalent or more than its unit size. This means areas with contiguous or collaborative farming of target crops (FPOs, FIGs, Cooperatives, etc.). The project promoter can be FPOs, a local enterprise, existing wholesalers or logistics service provider.
- b. Each pack-house should have target markets in mind, normally a high population centre, at a distance from the farming area. This will help to define the reefer transport units that need to be attached to each pack-house. As a norm, at least two reefer units should be attached to each pack-house for dispatch. Rural youth as driver entrepreneurs would be the preferred project owner.
- c. Cold Bulk Stores would be developed in areas where a suitable seasonal crop is farmed in sufficient volumes. Example of potato is easily understood. The bulk storage would be used to feed demand from consumption centres in off-season to offset episodic supply. Target promoters could be traders, FPOs, service providers.
- d. Cold Stores as Hubs would be required at or close to high density consumption centres, located independently or at wholesale mandis, where possible. States could enrol existing wholesalers or professionals to set up such cold storage hubs. Cross functional uses, in form of multiple temperature zones for horticultural and non-horticultural uses should be supported.

III. Implementation through Central Sector schemes

The above mentioned steps would also accordingly apply. However, central sector schemes can target large scale development and integration with other central projects, such as railways, seaports or cluster based food parks. The central sector schemes are also in a position to support projects under DEA's PPP scheme. Large logistics players such as PCTOs (private container train operators), transport service providers, shipping and inland waterways companies can be approached to integrate cold-chain with existing ventures.

Coordinating future development through other centrally owned infrastructure based agencies/ PSUs can also be undertaken by agencies implementing the central sector schemes. For example with CONCOR, central warehousing enterprises, Safal-Mother Dairy, SFAC, etc.

Additionally, the expertise and resources available with central sector schemes can be utilised to support modernisation and business development of existing large infrastructure, which may be ailing due to ageing, poor business model, or lack of backward or forward connectivity. This will ensure focussed support to utilise existing investments by correlating it with markets and farmers, adding to the larger agenda of integration of the cold-chain assets.

IV. Programme awareness & capacity building of banking sector

Knowledge dissemination to banking fraternity should form part of the regular workshops. In many cases reports indicate that a lack of credit product-lines by banks, is an impediment to the primary

access to funds. Government subsidy is now directly linked to bank term loans and therefore support from banking system is important.

V. Other Options for discussions

National level permits for reefer vehicles can be waived or minimised. The advantage will be to have each state horticulture mission register actual numbers of vehicles and to promote intra-state movements. Reefer vehicles may be allowed to use the passenger lanes at tolls to fast track movement at these bottleneck points.

Planning Departments of State governments can also nominate professional resource persons to interact/understudy with National Centre for Cold-chain Development (NCCD). The nominated teams from States would be provided with concept clarity, inputs to assist with local planning and inputs on business risks involved. They would then spearhead the action plans and implementation in their sponsoring States.

Funds reallocation can be considered to drive infrastructure components that are key to end-to-end cold-chain development. As such, development for cold stores can be with higher share of State contributions. On the other hand, a higher allocation from centre can be provided for pack-houses and reefer transport and for reefer rail development. Similarly, ripening chambers can be developed with greater participation of State's exchequer.

Redistribution of release of capital linked subsidy can be undertaken, such that a share of subsidy is allocated against volumetric flow of targeted crops. For e.g., electricity or transport costs can be subsidised for every 1000 tons of produce handled, upto first three years or 100% capacity use, whichever is first.

VI. Major concerns in this Sector

1. Regular supply of electric power: MIDH scheme includes support for installing of non-conventional energy systems. This includes Solar PV, Solar thermal, geo-thermal, bio-mass and hybrid applications of the same. Use of non-conventional applications not only off-sets the cost of energy but can also replace the energy source to a certain extent. For added advantage, good design and installation can minimise heat ingress into refrigerated spaces.
2. Integration with markets: this requires base infrastructure in forms of roads and rail connectivity. However, MIDH provides opportunity to scale up development of reefer vehicles, multi-modal reefer containers and temperature controlled retail cabinets.
3. Price sensitivity of markets: the concern maybe fallacious as market for imported produce is growing at higher prices. Volume of domestic produce in the cold-chain is far less compared to same crops under import. Furthermore, cold-chain eventually promotes farm level productivity by providing an avenue to reach more consumers. The ensuing increase in productivity further reduces input costs for the domestic produce.
4. Lower produce volume: this may be occurring because of little presence of pack-houses which are the first link in market connectivity. With provision of a window to access distant markets, farmers can be expected to collaborate to produce common crop types to avail the facility. This is evident in successful collaboration in case of tomato farming in Chhattisgarh.

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