


# ENABLING COLD-CHAIN INFRASTRUCTURE DEVELOPMENT IN INDIA

## EVOLUTION AND ASSESSMENT OF POLICIES AND INSTITUTIONAL MAPPING







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## **PROJECT: ALLIANCE FOR SUSTAINABLE HABITAT, ENERGY EFFICIENCY AND THERMAL COMFORT (SHEETAL)**

The Alliance for Sustainable Habitat, Energy Efficiency and Thermal Comfort (SHEETAL) is a consortium of Civil organizations led by The Energy and Resource Institute (TERI) with the Alliance for an Energy Efficient Economy (AEEE), and the Council on Energy, Environment and Water (CEEW) as partners. Supported by CIFF, SHEETAL facilitates the roll out of India's sustainable cooling agenda enshrined in the India Cooling Action Plan. Engaging with national and international stakeholders, the consortium partners discuss, identify and test integrated approaches best suited to improve the development, access and use of energy efficient cooling practices and technologies for R&D, space cooling, cold-chain, transport air-conditioning, and the servicing sector. SHEETAL convene different line ministries and international and domestic cooling policy experts to collaborate and synergise actions to accelerate sustainable cooling in India.

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CIFF is a philanthropy organisation working towards the upliftment of children's quality of life, in developing countries. There areas of work are inclusive of maternal and child health, adolescent sexual health, nutrition, education, and deworming, tackling child slavery and exploitation, and supporting smart ways to slow down and stop climate change. Their prime focus towards quality data and evidence-based approach to measure the impact.

## **PREPARED BY: ALLIANCE FOR AN ENERGY EFFICIENT ECONOMY (AEEE)**

Alliance for an Energy-Efficient Economy (AEEE) is a policy advocacy and energy efficiency market enabler with a not-for-profit motive. AEEE advocates energy efficiency as a resource and collaborates with industry and government to transform the market for energy-efficient products and services, thereby contributing towards meeting India's goals on energy security, clean energy, and climate change. AEEE collaborates with diverse stakeholders such as policymakers, government officials, business and industry, consumers, researchers, and civil society organizations. We believe that our work speaks for itself and we hold Respect, Integrity, and Synergy as central to our efforts.

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# ABBREVIATIONS

<b>ABD</b>	Agri-Business Development
<b>AMI</b>	Agricultural Marketing Infrastructure
<b>APEDA</b>	Agricultural & Processed Food Products Export Development Authority
<b>APLM</b>	Agriculture Produce and Livestock Marketing
<b>APMC</b>	Agricultural Produce Market Committee
<b>APMR</b>	Agriculture Produce Marketing Regulation
<b>ASTM</b>	American Society for Testing and Materials
<b>AWSA</b>	Agrichemical Warehousing Standards Association
<b>BEE</b>	Bureau of Energy Efficiency
<b>CDB</b>	Coconut Development Board
<b>CIH</b>	Central Institute for Horticulture
<b>DAC&amp;FW</b>	Department of Agriculture, Cooperation & Farmers' Welfare
<b>DRSCs</b>	Department Related Standing Committees
<b>ECA</b>	Essential Commodity Act
<b>FDI</b>	Foreign Direct Investment
<b>FPCs</b>	Farmer Producer Companies
<b>FPOs</b>	Farmer Producer Organisations
<b>GDP</b>	Gross Domestic Product
<b>GHGs</b>	Greenhouse Gases
<b>GrAMs</b>	Gramin Agricultural Markets
<b>HMNEH</b>	Horticulture Mission for North East & Himalayan States
<b>ICAP</b>	India Cooling Action Plan
<b>ISAM</b>	Integrated Scheme for Agricultural Marketing
<b>KVKs</b>	Krishi Vigyan Kendras
<b>MIDH</b>	Mission for Integrated Development of Horticulture
<b>MMLPs</b>	Multimodal Logistics Parks
<b>MoCI</b>	Ministry of Commerce and Industry
<b>MoA&amp;FW</b>	Ministry of Agriculture and farmer's Welfare
<b>MoFPI</b>	Ministry of Food Processing Industries
<b>MRIN</b>	Marketing Research and Information Network
<b>MT</b>	Million Tonnes
<b>NABARD</b>	National Bank for Agriculture and Rural Development
<b>NARS</b>	National Agricultural Research System
<b>NBM</b>	National Bamboo Mission
<b>NCCD</b>	National Centre for Cold-chain Development
<b>NCDC</b>	National Cooperative Development Corporation
<b>NHB</b>	National Horticulture Board
<b>NHM</b>	National Horticulture Mission
<b>NIAM</b>	National Institute of Agriculture Marketing
<b>NLA</b>	National Level Agencies
<b>PMKSY</b>	Pradhan Mantri Kisan SAMPADA Yojana
<b>PPP</b>	Public Private Partnership
<b>RKVI</b>	Rashtriya Krishi Vikas Yojana
<b>SAGF</b>	Strengthening of Agmark Grading Facilities
<b>SAMPADA</b>	Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters
<b>SDM</b>	Sub-divisional Magistrate
<b>SFAC</b>	Small Farmers Agribusiness Consortium
<b>TWh</b>	Terawatt-hour
<b>VGf</b>	Viability Gap Funding
<b>WDRA</b>	Warehousing Development and Regulatory Authority

# EXECUTIVE SUMMARY

India has seen a surge in the production of perishable high nutrition products in recent years. Fruits, vegetables, meat and poultry products top this list. However, large production volumes have not been able to address prevailing conditions of under-nutrition and hunger in the country. Additionally, India's current global share in farm trade is still negligible, owing to a considerable amount of food loss across the supply chain. A unidimensional focus on food production, without taking into consideration the importance and need of quality food supply to households has contributed to the problem manifold. The necessity to produce more will multiply further with India's growing population. Further, the increased production needs to be accompanied by a timely consumption of the produce to stop the food loss. In this regard, an efficient connectivity from farm to table to reduce food wastage is thus needed to develop and strengthen our cold-chain supply and storage facilities.



**India has seen a surge in the production of perishable high nutrition products in recent years. Fruits, vegetables, meat and poultry products top this list.**

A well-managed, temperature-controlled supply chain network has several benefits. It can reduce food wastage, minimise food inflation, ensure food quality, and improve shelf lives of perishable products, among other things. Additionally, cold-chain infrastructure will also benefit the farmers with timely connecting them to the market, thereby reducing their crop loss and increasing their net profit. However, given the energy-intensive nature of the current cold-chain infrastructure in India, the environmental implications and cost-effectiveness of the system are contentious. The negative ecological and economic impacts can be toned down by acting on some of the strategies indicated in the India's Cooling Action Plan (ICAP)<sup>1</sup> related to cold-chain infrastructure development. These strategies can also contribute to achieving the Sustainable Development Goal of "Zero Hunger", "Good Health and Well-being", "Responsible Consumption and Production", and "Climate Action".

Successful cold-chain implementation in various parts of the country requires a much-needed push through policies, access to finance, technology innovation. It is equally important to spread awareness around the importance of the cold-chain supply process(es) among the stakeholders responsible for planning, building, maintaining and monitoring these cold-chains. The Government of India recognises these essential steps and is proactively working towards developing a sustainable cold-chain across Indian states through five-year plans, missions, policies and dedicated agencies/departments. It is also provisioning financial assistance and capacity support to upgrade the cold-chain infrastructure. However, the existing reports and literature on cold-chain infrastructure indicate that institutional strengthening and development of the integrated cold-chain need a far more concerted effort. Moreover, lack of clarity around roles and responsibilities of the existing actors/stakeholders at the central, state and local level makes it difficult to implement and further capacity development. This report examines the various actors/institutions that play an essential role in cold-chain infrastructure development to bridge this gap.

This report briefly summarises the institutional and policy development of cold-chain in India, a) highlighting the various institutions/actors and their role(s) in cold-chain policy formulation and implementation b) mapping the past policies, plans and other government initiatives providing a historical context to the present policy narrative on cold-chain in India, and c) identifying the deficiencies/gaps in the existing policies, missing links in policies and paving the way forward. The key findings of this report are briefly summarised on next page:

➔ **The negative ecological and economic impacts can be toned down by acting on some of the strategies indicated in the India's Cooling Action Plan (ICAP) related to cold-chain infrastructure development. These strategies can also contribute to achieving the Sustainable Development Goal of**



1. The Indian plan (ICAP) was launched in March 2019 by the Ministry of Environment, Forests and Climate Change. The ICAP provides an integrated vision towards cooling across sectors encompassing inter alia reduction of cooling demand, refrigerant transition, enhancing energy-efficiency and better technology options with a 20 year time horizon.





01

Cold-chain institutional mapping at the policy formulation and implementation level highlight that a) central government play an important role in policy formulation, b) autonomous agencies at the national level strategise and facilitate these policies through various missions; and c) state and regional organisations aid and support in the actual implementation of these policies. While multiple ministries are already involved in implementing cold-chain across India, they operate in silos. They may need to combine their synergies to better plan and execute the development of cold-chain across India.



02

Past Five-Year plans, policies and missions are indicative of a heavy emphasis on food production with little or no measures to maintain production quality. Therefore, policies/guidelines on developing and maintaining cold-chain infrastructure are fewer and were formulated much later.



03

Examining the missions and policies about cold-chain development reveals that the central government's focus has been to support the cold-chain development by providing financial assistance, technological support, and capacity building. However, there is a scope to formulate policies/schemes that positively push towards building energy-efficient and low climate impact cold-chain infrastructure.

This report will be of particular interest to policymakers, research groups, and institutions trying to bridge India's cold-chain infrastructure gap. In addition, this may provide a starting point to the authorities within and outside India planning to develop the cold-chain infrastructure in identifying the various actors playing an essential role in planning and implementing the cold-chain infrastructure.







“

In recent years, India has emerged as the second-largest producer of fruits and vegetables globally, with 311.71 million tonnes of horticulture crops, of which only 1% was exported (2017-18)

# CONTEXT OF COLD-CHAIN IN INDIA



**India is predominantly an agrarian economy, with nearly 50% of the population still dependent on agriculture and its allied sectors. These sectors contribute up to 14.4% to the country's overall GDP (2011-12)**

.....

## 1.1 BACKGROUND: HORTICULTURE IN INDIA

India is predominantly an agrarian economy, with nearly 50% of the population still dependent on agriculture and its allied sectors. These sectors contribute up to 14.4% to the country's overall GDP (2011-12)<sup>2</sup>. However, India faced food deficiency post-independence, as horticulture development was not a priority in the immediate post-independence period. In the late 1980s and early 1990s, the country moved from being a food deficit country to a food surplus country. This change was brought about with improved access to fertilisers, seeds, irrigation, and financial assistance. In fact, in recent years, India has emerged as the second-largest producer of fruits and vegetables globally, with 311.71 million tonnes of horticulture crops, of which only 1% was exported (2017-18)<sup>3</sup>. Despite these areas of progress, a significant proportion of the population is at risk of becoming food insecure. Furthermore, farmers/food producers, especially the smallholder farmers, account for 86% of all farmers in India and own about half the arable land<sup>4</sup>, still struggle with low-income levels and huge food losses (nearly 4.6-15.9% in fruits and vegetables annually<sup>5</sup>) throughout the supply chain. Small-scale farmers cannot benefit from the post-harvest management facilities (consisting of pack houses, reefer vans, cold storages) because of limited access to cold-chain logistics, shortening the lifespan of their horticulture produce. Subsequently, the reduced lifespan causes a significant loss in their production value and livelihood.

Due to the absence of cold-chain infrastructure, the carbon footprint of food loss alone is estimated to be 3.3 GtCO<sub>2</sub>e (Gigatonnes of equivalent carbon dioxide).<sup>6</sup> Furthermore, the Central Institute of Post-Harvest Engineering and Technology has reported that the total post-harvest loss accounts for a loss of INR 1 lakh crore annually<sup>7</sup>. These losses are the result

2. NITI Aayog (2015). , Govt. of India, 2015

3. Bellmann, C. (2019). Subsidies and Sustainable Agriculture: Mapping the Policy Landscape. The Royal Institute of International Affairs, The Hoffmann Centre for Sustainable. London: Chatham House. Retrieved from: <https://www.chathamhouse.org/sites/default/files/Subsidies%20and%20Sustainable%20Ag%20-%20Mapping%20the%20Policy%20Landscape%20FINAL-compressed.pdf>

4. Ministry of Agriculture & Farmers Welfare, Government of India. 2019. "Agriculture Census 2015-16 (Phase-1): All India Report on Number and Area of Operational Holdings". New Delhi. [http://agcensus.nic.in/document/agcen1516/T1\\_ac\\_2015\\_16.pdf](http://agcensus.nic.in/document/agcen1516/T1_ac_2015_16.pdf).

5. MoFPI. (2017). World Food India 2017. Meeting with Ambassador and High Commissioners (pp. 1-29). New Delhi: GoI.

6. Food Agriculture Organization Retrieved from: [www.fao.org/fileadmin/templates/nr/sustainability\\_pathways/docs/FWF\\_and\\_climate\\_change.pdf](http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf)

7. Central Institute of Post-Harvest Engineering and Technology. (2019). Annual Report 2018-19. Ludhiana: ICAR.



of weak agricultural marketing sectors, including inadequate and fragmented food processing and post-harvest logistics, storage, and marketing. Therefore, the agricultural marketing sector requires strengthening of the cold-chain system through investments in infrastructure for value addition to agricultural produce, reduction in post-harvest losses, etc.

## 1.2. OVERVIEW OF COLD-CHAIN

While transporting food from farm to table, various factors, such as microbial, enzymatic, chemical, physical, and mechanical, lead to food spoilage<sup>89</sup>. These factors necessitate the development of cold-chain systems. The Cold-chain supply network needs to have a controlled condition to maintain product temperature in the adequate range, from storage to distribution. A typical cold-chain infrastructure (described in Figure 1) consists of four main components: pack-houses, reefer transport, cold storages, and ripening chambers. These components ensure a continuously monitored atmosphere till the product reaches the retail market. India is amongst the top producers of perishable products like fruits, vegetables, dairy etc.<sup>10</sup>, necessitating a constantly controlled temperature for such products. The atmosphere maintained by the cold-chain increases the shelf-life of perishable products, which in turn reduces the emission of methane due to decomposition. The adequate atmosphere also allows the product to preserve its nutrition and quality for an extended period, reducing post-harvest losses. Some direct benefits of cold-chain development relate to reduced food loss, improved farmers income, and reduced emission levels. Additionally, proper management of agricultural produce can directly or indirectly contribute to achieving sustainable development goals of “Zero Hunger”, “Good Health and Well-being”, “Responsible Consumption and Production”, and “Climate Action”.

➔ **Additionally, proper management of agricultural produce can directly or indirectly contribute to achieving sustainable development goals**



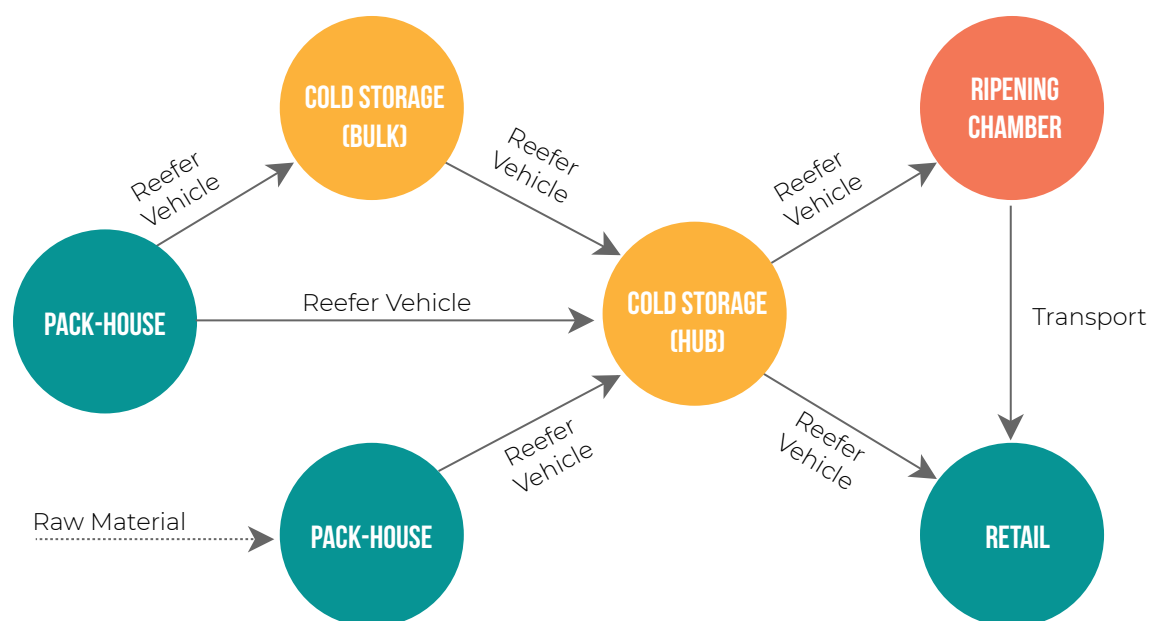
8. Rahman, M.S. Purpose of Food Preservation and Processing. In Handbook of Food Preservation; Marcel Dekker: New York, NY, USA, 2005; pp. 1-10.

9. Singh, R. Scientific Principles of Shelf-Life Evaluation; Man, C., Jones, A., Eds.; Blackie Academic and Professional: Glasgow, Scotland, 1994.

10. APEDA. (2021, March 4). Agricultural & Processed Food Products Export Development Authority. Retrieved from Fresh Fruits and Vegetables: [http://apeda.gov.in/apedawebsite/six\\_head\\_product/FFV.htm](http://apeda.gov.in/apedawebsite/six_head_product/FFV.htm)



**Figure 1: A typical cold-chain (Source: India Cooling Action Plan 2019)**



### 1.3. STATUS OF COLD-CHAIN IN INDIA

Since independence, the combined efforts of farmers/ other Agri-producers, dedicated teams of agricultural scientists, and the constant endeavour of policymakers have contributed to transforming Indian agriculture from an importer to a major exporter of food grains. However, the marketing network and post-harvest marketing infrastructure are not adequate to keep up with the growing production and marketable surplus. India has a large inventory of cold storages or refrigerated warehouses. Yet, the other elements that make up an uninterrupted cold-chain – pack houses, reefer transport and ripening chambers – are largely missing. As of 2016, the cold-chain sector investment of the entire developed infrastructure could accommodate only 10% of the horticulture produce<sup>11</sup>. As per the assessment by NCCD, the gap in one or more cold-chain infrastructure components is as high as 99%<sup>12</sup>. The below table provides a gap analysis in cold-chain infrastructure and the investment potential for individual cold-chain elements.



**With the present cold-chain infrastructure gap, growing population and the demand for food production, energy consumption in the cold-chain will increase to 158.45 TWh by 2027-28**

11. Madhu, S. (2016, December 1). Government's Role in India's Ailing Cold Storage Sector. Retrieved from Centre for Public Policy Research: <https://www.cppr.in/?s=Government%E2%80%99s+Role+in+India%E2%80%99s+Ailing+Cold+Storage+Sector>

12. Ministry of Environment, Forest & Climate Change. (2019). India Cooling Action Plan. New Delhi: MoEFCC

**Table 1: Cold-chain Infrastructure Gap<sup>13</sup>**

TYPE OF INFRASTRUCTURE	INFRASTRUCTURE REQUIREMENT	INFRASTRUCTURE CREATED	INVESTMENT POTENTIAL INR CRORES	% GAPS
Pack-house	70,080	249	66,339	99%
Cold Storage (Bulk)	341,64,411 Metric Ton	318,23,700 Metric Ton	2600	9%
Cold Storage (Hub)	9,36,251 Metric Ton		1260	
Reefer Vehicles	61,826	9,000	15,848	85%
Ripening Chamber	9,131	812	3,328	91%

GoI has launched several missions/schemes and formulated policies, recognising the importance of cold-chain to reduce the food losses and GHG emissions and the gap in the existing cold-chain infrastructure indicated in Table 1. Several initiatives have been launched to cater to the current cold-chain infrastructure gap and developing a more climate-friendly cold-chain infrastructure. The objective is to cater to majorly two types of markets: export and domestic consumption. Notwithstanding the several advantages of developing cold-chain infrastructure in India, the current energy-intensive framework results in high emissions, leading to environmental degradation. The annual energy consumption by the various components in cold-chain in 2017-18 was 71.84 TWh<sup>14</sup>. With the present cold-chain infrastructure gap, growing population and the demand for food production, energy consumption in the cold-chain will increase to 158.45 TWh by 2027-28<sup>15</sup>. In order to avoid high energy consumption in cold-chain infrastructure development and build sustainable cold-chain storage facilities, the India Cooling Action Plan recommends to a) apply appropriate policy measures to drive efficiency of equipment, b) periodic revision of energy efficiency norms, c) provide incentives for adoption of energy-efficient designs and d) develop Management Information System that would ensure inter-ministerial collaboration for tracking and monitoring the overall efficiency of cold-chain infrastructure.



**The annual energy consumption by the various components in cold-chain in 2017-18 was 71.84 TWh. With the present cold-chain infrastructure gap, growing population and the demand for food production, energy consumption in the cold-chain will increase to 158.45 TWh by 2027-28**

13. National Centre for Cold-chain Development. (2015). All India Cold-chain Infrastructure Capacity (Assessment of Status & Gap), Delhi. Retrieved from: [https://nccd.gov.in/PDF/CCSG\\_Final%20Report\\_Web.pdf](https://nccd.gov.in/PDF/CCSG_Final%20Report_Web.pdf)

14. Ministry of Environment, Forest & Climate Change. (2019). India Cooling Action Plan. New Delhi: MoEFCC

15. *ibid.*

## 1.4. ABOUT THE REPORT

This report provides an overview of the institutional and policy landscape in the development of the horticulture cold-chain sector, including:-



01

The role of organisations at the Centre, state and regional levels concerning cold-chain development indicating missing/unknown links in the institutional landscape.



02

Highlighting the significant events in the evolution of cold-chain in India and limitations of the five-year plans.



03

Recent policy reforms that accelerated the development of cold-chain infrastructure in India.



04

Identifying the way forward for cold-chain development in the context of climate change and energy efficiency.









# INSTITUTIONAL FRAMEWORK

The cold-chain sector is directly related to various other sectors like food, commerce, health etc. and hence needs to be governed by multiple ministries in coordination. This section briefly elaborates on the major governmental actors involved in carrying out the cold-chain sector's development. India complies with a three-tier governance structure with responsibilities distributed at horizontal and vertical levels. The Central-level organisations formulate policies. State and regional level organisations implement these policies.

## 2.1 CENTRAL, STATE AND LOCAL ORGANISATIONS

The central agencies frame policies, respective state governments implement these policies, and monitor their progress. Coordinated efforts between the Centre and the States will be significant for the effective implementation of policies. Table 2 summarises the roles and responsibilities of the governing authorities at the centre, state and local level, highlighting the various missions rolled out to advance the agricultural reforms and help develop agriculture and related sectors. The table also highlights the role of these organisations specific to cold-chain development in India.



**Cold-chain sector is directly related to various other sectors like food, commerce, health etc. and hence needs to be governed by multiple ministries in coordination.**

**Table 2: Institutions and their Role and Responsibility**

LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
<b>Central Government: As per the seventh schedule of the Indian Constitution, the role of the Central Government in the cold-chain sector is to manage the export of products, inter-state trade, etc.</b>			
Centre	<b>Ministry of Agriculture and Farmers Welfare (MoA&amp;FW)</b>	The significant role of MoA&FW is to formulate policies and regulations for the agriculture sector in India. The Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW) works directly for the well-being of farmers and implementation programs formulated by the ministry. The ministry has started major initiatives like Mission for Integrated Development of Horticulture (MIDH), Rashtriya Krishi Vikas Yojana (RKVY), Integrated Scheme for Agricultural Marketing (ISAM), etc.	The initiatives such as MIDH and ISAM aim to create a path for holistic growth of the agriculture sector, including the provision of adequate storage facilities to ensure the quality of the product; hence, the ministry has a significant role in developing the cold-chain infrastructure.
Centre	<b>Ministry of Food Processing Industries (MoFPI)</b>	MoFPI monitors and governs the aspects of food processing and post-harvest agriculture produce management, and the significant initiatives launched include the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters, i.e. Pradhan Mantri Kisan SAMPADA Yojana.	MoFPI is one of the key agencies involved in the development of cold-chain infrastructure as major schemes launched by MoFPI such as Pradhan Mantri Kisan SAMPADA Yojana aims to enhance the food processing efficiency of agriculture and minimise food waste at the processing stage by providing adequate infrastructure for storage, transportation, and processing of agro-food produce.
Centre	<b>Ministry of Commerce and Industry (MoCI)</b>	MoCI aims to promote export and ensure product quality, which includes agriculture and allied activities. The Department of Commerce is responsible for formulating trade policies that provide strategies and guidelines for export and trade. MoCI directs APEDA, which is the critical agency in the trading of agricultural products.	The MoCI is indirectly related to the development of the cold-chain sector as it creates demand for high-quality agricultural produce for export. It creates the demand for the cold-chain to maintain the quality of perishable produce. Agencies such as APEDA is involved in developing an integrated packhouse facility to ensure quality for the export of fresh fruits and vegetables.

LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
Centre	<b>National Bank for Agriculture and Rural Development (NABARD)</b>	National Bank for Agriculture and Rural Development is an apex regulatory body for the overall regulation and licensing of regional rural banks and apex cooperative banks in India. It is under the jurisdiction of the Ministry of Finance, Government of India. NABARD has representation at the state and district level in each state.	<p>NABARD's mission is to promote sustainable and equitable agriculture and rural development through participative financial and non-financial interventions, innovations, technology and institutional development for securing prosperity. NABARD offers post-harvest management support, which is credit and non-credit related:</p> <p>Credit-Related Support:</p> <ul style="list-style-type: none"> <li>• Provide loans to the state governments for developing rural infrastructure and strengthening Cooperative Credit Structure</li> <li>• Provide loans for warehousing infrastructure to State Governments, State/ Central government Owned/ assisted entities, Cooperatives, Federation of cooperatives, FPOs, Primary Agricultural Credit Societies (PACS) or similar institutions, Corporates/ Companies, Individual entrepreneurs, etc.</li> </ul> <p>Non-Credit Related Support:</p> <ul style="list-style-type: none"> <li>• Provide assistance in policy formulation to GoI, RBI and State Governments on matters related to agricultural credit and rural development</li> </ul>

LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
Autonomous Bodies	<b>National Centre for Cold-chain Development (NCCD)</b>	<p>NCCD is an autonomous body that aims explicitly to develop the cold-chain sector across all the segments. Its objectives are:</p> <ul style="list-style-type: none"> <li>• To formulate policies, interventions, guidelines for India's perishable agriculture products</li> <li>• To be advisory to India's government in the matters related to reducing post-harvest losses of perishable farm produce, securing the remunerative price of farm produce to farmers, availability of fresh fruits &amp; vegetables to consumers at affordable prices, and other cold-chain related aspects</li> <li>• To do certification of cold-storage and their ratings</li> </ul>	<p>NCCD is one of the critical organisations established to promote and develop integrated cold-chains in India. It plays its role by creating standards for cold-chain infrastructure, suggesting strategies for human resource development, and recommending policy frameworks to the government.</p> <p>NCCD operational guidelines specify the minimum investment required for the development and setting up of pre-cooling units and cold rooms. They set out the possible options focusing on materials, lighting system, cooling system and automation.</p>
Autonomous Bodies	<b>Small Farmers Agri-business Consortium (SFAC)</b>	<p>SFAC is a society promoted by the Ministry of Agriculture and Farmers' Welfare to increase incomes of small and marginal farmers and pioneered Farmer Producer Organisations (FPOs)/ Farmer Producer Companies (FPCs).</p>	<p>SFAC focuses on the growth of farmers and aims towards the increased income of farmers. The objective is to increase agribusiness and increase price recovery for agricultural produce, indirectly related to the cold-chain sector.</p>
Autonomous Bodies	<b>National Cooperative Development Corporation (NCDC)</b>	<p>NCDC is a statutory corporation under the Ministry of Agriculture &amp; Farmers Welfare with these objectives:</p> <ul style="list-style-type: none"> <li>• To plan, promote and finance interventions to promote agricultural production, marketing, storage, export, etc.</li> <li>• To be nodal agency of India's government for implementing schemes of various ministries and provide loan assistance at an appealing interest rate for creation of Cold-chain facilities and dovetail the same with the grant-in-aid assistance from the Government of India</li> </ul>	<p>NCDC provides financial assistance for developing infrastructures like processing units, adequate storage facilities and a marketing place and providing financial aid for storage facilities to become one of the leading entities directly linked with the development of cold-chain infrastructure.</p>



LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
Autonomous Bodies	<b>Agricultural &amp; Processed Food Products Export Development Authority (APEDA)</b>	<p>APEDA is an organisation established under the Ministry of Commerce &amp; Industries. It has these objectives:</p> <ul style="list-style-type: none"> <li>• To develop/increase the export of products</li> <li>• To ensure the quality of products to be exported</li> </ul>	APEDA is involved in developing an integrated packhouse facility to ensure the export of fresh fruits and vegetables. APEDA, as a part of the strategy, is setting up cold-chain to develop the industries relating to the scheduled products for export. The Scale of assistance is 40% subsidy subject to a limit of INR 75 lakhs for cold-chain projects with mechanised handling system.
Autonomous Bodies	<b>National Horticulture Board (NHB)</b>	On the "Group on Perishable Agricultural Commodities" recommendation, NHB was set up under the Ministry of Agriculture and Farmers Welfare administrative control. NHB focused on the integrated development of the horticulture industry and promoted research and development, new-age technology and awareness.	NHB is working towards developing an integrated and energy-efficient cold-chain infrastructure for horticulture produce to improve the horticulture sector. It also focuses on developing market facilities for fresh produce by providing an adequate environment to maintain its quality.
<b>State Government: As per the seventh schedule of the Indian Constitution, agriculture, including agricultural education &amp; research, protection against the pest, fisheries, trade &amp; commerce within the state, markets &amp; fairs, etc. are state subject; hence the Union Government can act as an advisory or guiding authority and prepare policies, mission and other interventions for supporting the development of the sector. In contrast, it is the State Government's responsibility to adopt the existing policy and develop its strategies accordingly.</b>			
State	<b>State Horticulture Boards (SHB)</b>	State Horticulture Boards are registered societies established to implement the National Horticulture Mission in respective states. It also ensures end-to-end development of the horticulture sector, including processing, marketing, management etc.	As the functioning of National Horticulture Boards, SHBs are responsible for developing integrated and energy-efficient cold-chain infrastructure for fresh horticulture produce in their respective states.
State	<b>Agricultural Produce Market Committees (APMCs)</b>	APMC is a marketing board established to ensure that retailers do not exploit any farmer, and the price of the product does not become excessively high in the transition.	APMCs aim to ensure economic, legal and good infrastructural conditions for trading within their jurisdiction.

LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
State	<b>State Agriculture Marketing Board</b>	<p>State Agriculture Marketing Boards are statutory boards established in respective states to develop and coordinate the growth of the agricultural marketing system. It has two primary objectives:</p> <ul style="list-style-type: none"> <li>• To undertake state-level planning of the development of the agriculture markets</li> <li>• To make necessary arrangements for publicity related to marketing matters.</li> </ul>	State Agriculture Marketing Boards provide a platform for trading agricultural produce to farmers. They are directly linked to the supply chain of agriculture and allied activities related to cold-chain infrastructure.
Local	<b>Farmer Producer Organisations (FPOs)</b>	FPOs are autonomous self-help organisations controlled by farmer members. They are formed to mobilise and develop the capacity of farmers to leverage market strength.	FPOs act as the first node to assess market demand and are an essential stakeholder, which indirectly impacts the cold-chain development in their jurisdiction area.
Local	<b>Krishi Vigyan Kendras (KVKs)</b>	<p>KVKs are established under MoA&amp;FW and are an integral part of the National Agricultural Research System (NARS) with the objective to:</p> <ul style="list-style-type: none"> <li>• To provide knowledge and resource of agricultural technology and allied initiatives available for local farmers of the district</li> <li>• To perform on-farm testing to access specific requirements and technologies of location-specific farmlands</li> <li>• To provide farm advisories subject(s) of interest for farmers and enhance the capacity of farmers by upgrading their skills and knowledge on modern agriculture technologies</li> </ul>	KVKs disseminate information about government policy and help farmers be aware of the facilities and infrastructure available to them.

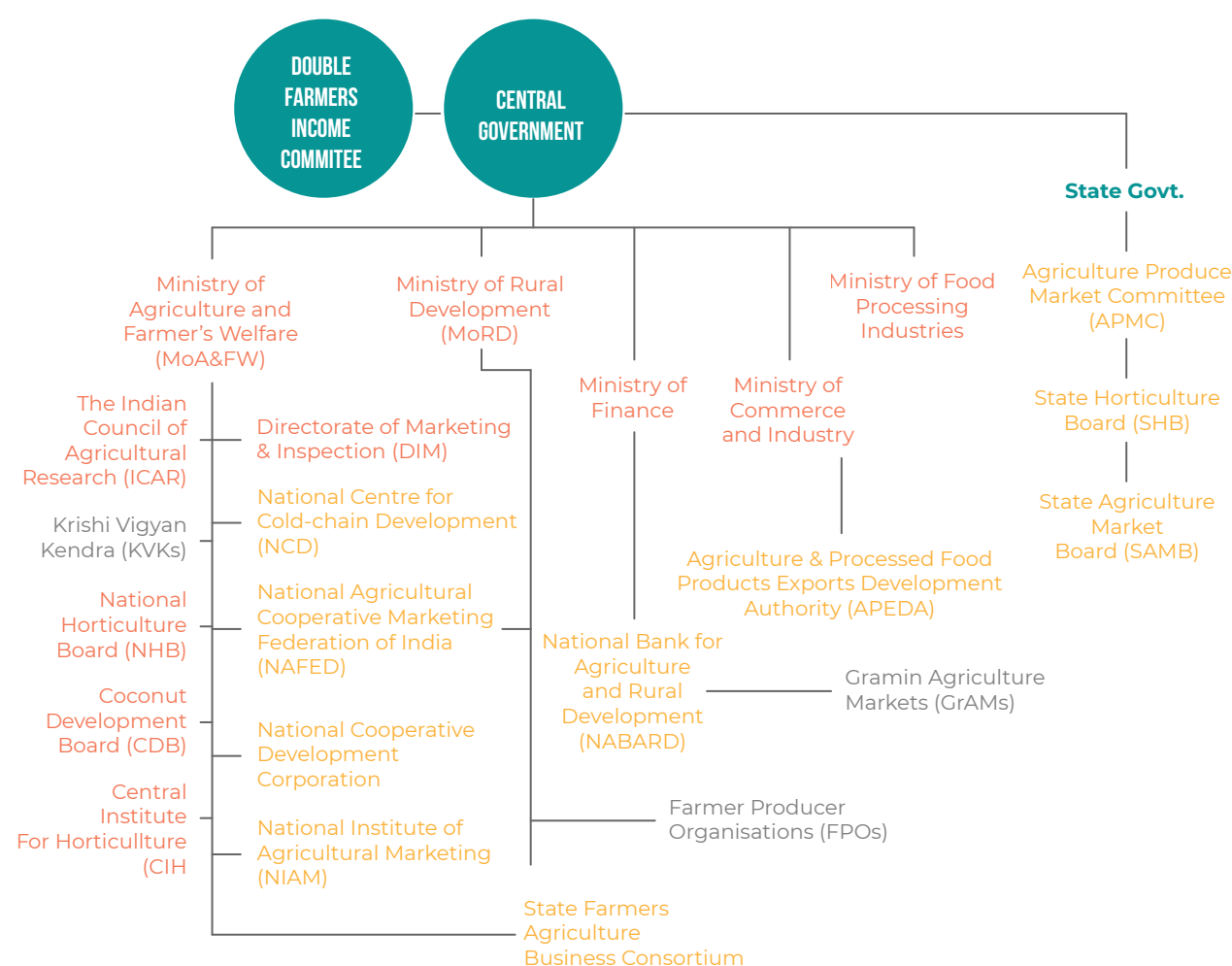
LEVEL	ORGANISATION'S NAME	ROLES AND RESPONSIBILITY	INDICATIVE ROLE IN COLD-CHAIN
Local	<b>Gramin Agricultural Markets (GrAMs)</b>	<p>Gramin Agricultural Markets belong to the lowest level in the hierarchy of markets usually located at the village level, established to initiate and service transactions at terminal destination. Its objectives are:</p> <ul style="list-style-type: none"> <li>• To create a linkage between the supply-side and demand-side at the local level</li> <li>• To be an intermediary between primary, secondary and tertiary sectors</li> </ul>	Gramin Agricultural Markets act as a first and last mile in the supply chain of agricultural produce and hence creates demand for a full-fledged cold-chain infrastructure.

Table 2 discussed the institutions that play an essential role in policy formation associated with cold-chain infrastructure development. However, it does not capture the organisations which work hand in hand with the listed organisations to execute and implement cold-chain infrastructure development. For instance, the Ministry of Rural Development and the Ministry of Finance have an essential role in implementing cold-chain development as the table majorly discusses only agriculture-related departments. Similarly, to develop an energy-efficient cold-chain infrastructure in India, as highlighted in ICAP, it is essential to include other critical players such as the Ministry of Power, which is not captured under ministries relevant to cold-chain infrastructure development. Therefore, mapping all the relevant departments should be the first step, and not limited to agriculture focus departments, to develop an energy-efficient and more-climate friendly cold-chain infrastructure in a holistic manner.

Figure 2 (next page) attempts to map the significant institutes at the central, state and local level that are majorly responsible in cold-chain infrastructure development, indicating that governance structure mainly works top-down where the producers/farmers have very little to say. Additionally, the ministries primarily work in silos and need to work in an integrated manner to bring changes in the cold-chain infrastructure. In this regard, Doubling Farmers' Income (DFI), a cross-ministerial initiative, is working towards addressing the cold-chain infrastructure gap, but further measures are needed to work collaboratively in developing infrastructure in India.

➔ To develop an energy-efficient cold-chain infrastructure in India, as highlighted in ICAP, it is essential to include other critical players such as the Ministry of Power, which is not captured under ministries relevant to cold-chain infrastructure development.

**Figure 2: Institutional framework governing cold-chain in India**



## 2.2. SPECIAL COMMITTEES

Several committees have come up from time to time to help formulate new policies based on the market demand and assessment of existing policies to speed up the implementation process.

- High-Level Expert Committee (1998)
- Planning Commission Committee (2012)
- Task Force for Cold-chain Projects (2014)
- High Powered Committee for Agriculture Reforms (2019)

These committees may include members from one or more ministries, departments, or organisations for developing the cold-chain sector. The following subsections highlight some of these Committees and Task Forces that have shaped the cold-chain sector.

## High-Level Expert Committee (1998)<sup>16</sup>

A High-Level Expert Committee was constituted in 1998 under the Additional Secretary Shri JNL Srivastava. The Committee assessed an infrastructure gap of 3.9 million tonnes in cold storage capacity for horticultural crops as of 1998. When the horticultural production stood at 130 million tonnes, the total available cold storage capacity was 11.1 million tonnes. Since 1998, horticultural production has more than doubled to about 300 million tonnes (in 2016-17), and the cold storage capacity has tripled to about 34 million tonnes of space. The report stated that a holistic approach to ensure appropriate supply chain management from farm to consumer needs to be studied for appropriate development.

## Planning Commission Committee (2012)<sup>17</sup>

A committee headed by Shri Soumitra Choudhary, Member Planning Commission, produced a report on encouraging the investment for the provision of cold-chain to have a more efficient supply chain in the country. The Committee's key recommendation was that the cold-chain system would expressly not follow a pure price arbitrage business model but should aim to smoothen the episodic output with steady demand, resulting in greater price stabilisation and market connectivity. It also inferred that this was due to significant deficiencies in the logistics system between the farms to the final consumers. There must be a framework for the direct linkage of farmers to markets via the cold-chain. Moreover, the Committee emphasised the integration of logistics and food processing units for more effective market linkage. Some of the other recommendations are mentioned below:

- Inclusion of outside investors and encouraging FDI in the cold-chain sector.
- Increase in financial flexibility, meaning it was recommended that the Warehousing Development and Regulatory Authority (WDRA) help farmers obtain warehouse receipts, allowing farmers to raise funds from banks.
- Removal of perishable agricultural produce from the aegis of the APMC act giving farmers the freedom to sell their product directly to retailers, aggregators or food processing companies in addition to mandis.
- Simplification of the clearances and licenses required for setting up the cold storage.



**Since 1998, horticultural production has more than doubled to about 300 million tonnes (in 2016-17), and the cold storage capacity has tripled to about 34 million tonnes of space**

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## Task Force for Cold-chain Projects (2014)<sup>18</sup>

The Ministry of Food Processing and industries constituted a task force for planning and implementing cold-chain projects in September 2014. The task force included members from MIDH, the Department of Agriculture and Cooperation, and the likes. The objective of constituting the Task Force was to revisit the strategies of all schemes, recommend an institutional mechanism for enhancing the sector and identifying the role of various levels of government and private players. The task force put aside the NSEL report that recommended creating 61 million tonnes in cold storages in their discussions; it emerged that the gap in cold storage capacity, earlier assessed at 29 million tonnes based on the NSEL review, may not be accurate

16. Committee for Doubling Farmers' Income. (2017). Report of the Committee for Doubling Farmers' Income, Volume -III. Ministry of Agriculture & Farmers' Welfare.

17. *ibid.*

18. *ibid.*

and recognised the need for a more realistic assessment of cold storage/cold-chain capacity. Further, the task force agreed to target an additional capacity building of 7.5 million tonnes over the next five years (2015-2020). Some of the other recommendations mentioned were as below:

- The Task Force emphasised the Public-Private Partnership (PPP) mode with Viability Gap Funding (VGF) as the most appropriate catalyst for developing large scale investment and development in the sector.
- Exemption of specific processes undertaken on the agricultural produce to enhance the marketability or shelf life of the product from the purview of service tax.
- Reduction in the fees for registration of reefer vehicles for the national permit.

### High Powered Committee for Agriculture Reforms (2019)<sup>19</sup>

The prime minister set up a nine-member High-Powered Committee of Chief Ministers for 'Transformation for Indian Agriculture' in 2019. It is serviced by NITI Aayog and comprises CMs of Maharashtra, Karnataka, Haryana, Arunachal Pradesh, Gujarat, Uttar Pradesh, Madhya Pradesh, and Agriculture Minister of Agriculture Rural Development & Panchayati Raj. The Committee was established to suggest measures for transforming agriculture and raising farmers' income; modalities for adoption and time-bound implementation of reforms such as APLM Act 2017 by states; offer changes in the Essential Commodity Act (ECA), 1955 to attract private investments; a mechanism for linking of market reforms with e-NAM, GRAM; policy measures to boost agricultural export; and steps to upgrade agri-technology to global standards.



**Task force agreed to target an additional capacity building of 7.5 million tonnes over the next five years (2015-2020)**

## SECTION SUMMARY

**Most committees and the task force groups described above recognized the cold-chain infrastructure gap and emphasised the need to build more cold-chain infrastructure and indicated the need to develop this cold-chain infrastructure in public-private manner but did not highlight the type of cold-chain infrastructure needed in the Indian horticulture and the need to develop more climate friendly and efficient cold-chain infrastructure which is currently the need of the industry.**

19. Committee for Doubling Farmers' Income. (2017). Report of the Committee for Doubling Farmers' Income, Volume -III. Ministry of Agriculture & Farmers' Welfare.









# EVOLUTION OF COLD-CHAIN IN INDIA

## 3.1 FIVE-YEAR PLANS

This section summarises the various five-year plans and their contribution to India's existing cold-chain infrastructure and the policies, missions, and other programs to strengthen India's cold-chain infrastructure further. Table 3 below discusses the five-year plans focusing on cold-chain infrastructure development in India. Additionally, the table highlights the primary propositions connected to the cold-chain elements, such as building more storage facilities and related targets in various five-year plans.

**Table 3: Five Year Plans and Special Interventions Proposed**

FIVE-YEAR PLAN	COLD-CHAIN SPECIFIC INTERVENTIONS PROPOSED	PLANNED TARGETS/ALLOCATION OF FUNDS
1951-1956	Identified the need to have a long-term storage mechanism	Bombay, Madras, Madhya Pradesh, Mysore, Hyderabad and Travancore rolled out their first-ever legislations to set up Licensed Warehouses
1956-1961	-	MoA&FW planned investment of INR 1.75 crores in setting up of storage facilities and canning industries
1961-1966	Proposed to increase the storage capacity with involvement of private players	The central government allocated a total of INR 33 crores for the construction of godowns for the storage of food grains and warehousing programmes
1966-1969	The government postponed the implementation of the 4th Five-Year Plan and instead introduced 3 annual plans. During these yearly plans, strategies like wide-spread distribution of high-yielding varieties of seeds, extensive use of fertilisers, exploitation of irrigation potential and soil conservation were used for enhancing agriculture productivity. Thus, the focus majorly remained on pre-harvest related activities.	
1969-1974	Identified the need for storage for end products and for seeds to be channelised through the Food department and Food Corporation of India, Central and State warehousing corporations, other cooperatives, State governments, etc.	Countrywide 'Save Grain Campaign' launched to enhance the storage of surplus production, which included: <ul style="list-style-type: none"> <li>Regulating licensing of food grain dealers and obligate them to make hygienic arrangements for storage</li> <li>Improving storage for animal husbandry, and intended to develop 73 ice factories and 45 cold storages along with refrigerated rail vans</li> </ul>

FIVE-YEAR PLAN	COLD-CHAIN SPECIFIC INTERVENTIONS PROPOSED	PLANNED TARGETS/ALLOCATION OF FUNDS
<b>1974-1978</b>	It did not emphasise specifically on the rising demand for storage facilities or investment targeted for the same	Launched the Construction of 'Godowns Scheme' to build and enhance storage capacity
<b>1978-1980</b>	With the change of government in power, the five-year plan was getting revised in this period.	
<b>1980-1985</b>	Extensively detailed the need for the storage facility, proposing a national grid of storage facilities at three levels, i.e. National Level, State/ regional level, and village level. Additionally, it highlighted the need for building cold storage and processing facilities for perishable commodities.	<ul style="list-style-type: none"> <li>Planned an additional facility of 131.60 lakh tonnes; provided an outlay of INR 259 crores</li> <li>Proposed storage facilities for both perishable and non-perishable commodities under the 'Save Grain Campaign.'</li> <li>Initiated a centrally sponsored scheme of Rural godowns which would aid market committees or State Warehousing Corporations to construct godowns with a capacity of more than 200 tonnes</li> <li>Construction of additional storage for 35 lakh tonne and additional 151 cold storage for 5,34 lakh tonnes of storage capacity was set as a target to monitor the performance of agriculture cooperatives</li> </ul>
<b>1985-1990</b>	For the first time, identified the need for a cold-chain to store vaccines/drugs and prevent food adulteration properly.	Allocated INR 307.08 crores for food processing, storage, and warehousing facilities.
<b>1992-1997</b>	Highlighted the status of cold storage in India, indicating the existing inadequacy of cold storage facilities.	NCDC launched a project called NCDC-III assisted by the World Bank, under which a total of INR 575.67 crores was sanctioned for storage units, processing units and capacity building.
<b>1997-2002</b>	Acknowledged the shortage of storage facilities and the importance of supporting the marketing infrastructure but highlighted the disadvantage of overstocking, leading to an unwarranted spurt in the process, laying the foundation of limiting the storage of agricultural produce.	<ul style="list-style-type: none"> <li>Encouraged the panchayats to play a significant role in setting up cold storage and processing facilities close to the production centres in rural areas.</li> <li>The Central Government launched the 'Rural Godown Scheme' for providing the required assistance.</li> <li>Announced fiscal incentives to entrepreneurs in the form of tax reductions, exemption on customs duty, low-interest loan etc. which was targeted to attract private players in enhancing the storage facility</li> <li>Envisaged to construct 150 cold storage units</li> </ul>

FIVE-YEAR PLAN	COLD-CHAIN SPECIFIC INTERVENTIONS PROPOSED	PLANNED TARGETS/ALLOCATION OF FUNDS
<b>2002-2007</b>	Identified 'cold-chain' as one of the 11 major thrust areas for horticulture development	<ul style="list-style-type: none"> <li>Announced National Policy on Handling, Storage and Transportation of Food Grain focusing on: <ul style="list-style-type: none"> <li>reduction in loss due to improper storage and transit system</li> <li>encouraging scientific methods of storage to retail food quality and nutrition.</li> </ul> </li> <li>Proposed expenditure of INR 35 crores on Cold-chain Maintenance and INR 200 crores for cold-chain related equipment for immunisation purposes.</li> </ul>
<b>2007-2012</b>	Envisaged the development of food parks, integrated cold-chain facilities, strategic distribution centres and cluster-based preservation infrastructure, etc.	<ul style="list-style-type: none"> <li>Food Corporation of India allocated INR 632 crore to NHB and INR 166.65 crores for the construction of godowns</li> <li>Construction of 30 additional cold storage units and for enhancement of existing cold-chain infrastructure</li> <li>Introduced Warehouse Regulatory and Development Authority (WRDA) to set standards and modernise warehousing by the development of an e-trading system</li> </ul>
<b>2012-2017</b>	Cold storage and related aspects were brought under the jurisdiction of WRDA	<ul style="list-style-type: none"> <li>Targeted creation of around 32 million tonnes by 2022</li> <li>The Planning Commission had set up a committee to encourage investments in supply chains, including provision for cold storages for more efficient distribution of farm produce. The Committee recommended: <ul style="list-style-type: none"> <li>RIDF can be used to attract private players using the PPP model and Viability Gap Funding.</li> <li>To facilitate the recommendations given by the Committee, an Inter-Ministerial Group on Cold-chain Infrastructure and Allied Sectors had been set up by the government. The Committee also proposed the addition of 17 million tonnes of storage by the Department of Food and Public Distribution. Set up a committee on encouraging private investments in Supply Chains.</li> </ul> </li> </ul>



Five-year plans have played an important role in the evolution of cold-chain infrastructure in India. Figure 3 provides a snapshot of this evolution. The figure indicates that although the elements of cold-chain and its need was introduced from the first Five-Year Plan in warehousing/storage houses, the term 'Cold-chain' was first mentioned in the Five-Year Plan of 1985-1990. Moreover, its role in horticulture development was only recognised another ten years later in the 2002-2007 Five-Year plan. Before this period, the major emphasis was on building storage houses at national, state, and regional levels. In the 2002-2007 Five Year Plan, developing a cold-chain infrastructure using scientific methods to maintain better quality standards was stressed upon. The cold-chain infrastructure development can be divided into pre-2000 and post-2000 periods. The pre-2000 period policies recognised the need to build cold-chain infrastructure. However, most actions/plans/policies emphasised pre-harvest provisions. On the other hand, post-2000 the plans/policies accelerated the development of cold-chain infrastructure and its maintenance, which will be discussed in the subsequent section.

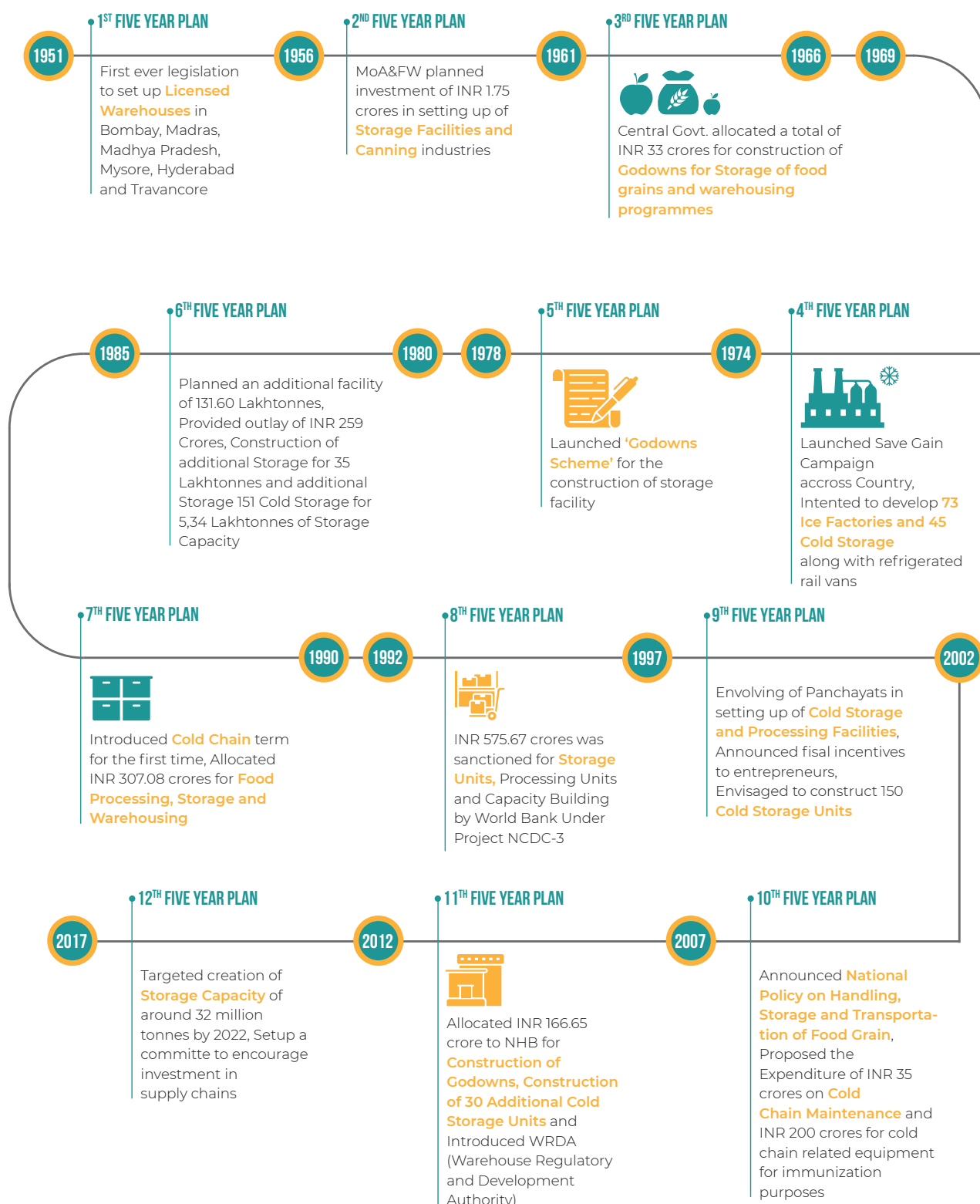
➔ **The elements of cold-chain and its need was introduced from the first Five-Year Plan in warehousing/storage houses, the term 'Cold-chain' was first mentioned in the Five-Year Plan of 1985-1990**





## Existing Policies, Missions and Programs

**Figure 3: Evolution of Cold-chain in India**



The five-year plans focused majorly on the pre-harvest management in agriculture, such as irrigation requirements, seeds/grains provision, etc. and there were only a few interventions related to post-harvest management facilities such as building cold storages, warehouses and godowns. This limited focus on post-harvest management facilities led to several limitations for farmers such as: fragmented and difficult access to markets, restriction in licensing, cap on higher limit of storage, information asymmetry and no major policy on developing more climate friendly cold-chain infrastructure.

### 3.2 POLICIES, MISSIONS AND PROGRAMS

Five-year plans provide a high-level goal towards developing cold-chain infrastructure. To achieve these goals, several missions/policies/schemes have been launched. This subsection briefly details schemes, missions, or programs to understand the present-day landscape of the cold-chain sector in the country.

Below Table 4 provides an overview of the major central and state government initiatives that have contributed to improving the state of post-harvest management in the country. Yet, most initiatives are concentrated around building cold-storages and less on developing an integrated cold-chain.



**Five-year plans provide a high-level goal towards developing cold-chain infrastructure. To achieve these goals, several missions/policies/schemes have been launched**

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**Table 4: Central Initiatives on Horticulture Cold-chain Development**

INITIATIVES/POLICY AND LAUNCH YEAR	OVERVIEW OF THE INITIATIVE IN THE COLD-CHAIN CONTEXT	IMPLEMENTING AGENCY IN THE STATE
<b>The Mission for Integrated Development of Horticulture (2014)</b>	Launched by the <a href="#">Ministry of Agriculture and Farmers Welfare</a> , the mission aims to support skill development and create employment generation opportunities for rural youth in horticulture and post-harvest management, especially in the cold-chain sector, through promoting R&D technologies for cultivation, production, post-harvest management and processing with a particular focus on cold-chain infrastructure for extending the shelf life of perishables.	State Department of Horticulture
<b>National Horticulture Mission</b>	A sub-scheme of MIDH, NHM is focused on providing financial assistance for cold-chain development. For instance, cold storage (long term storage and distribution hubs) up to 5,000 MT capacity are eligible for assistance under the open-ended scheme of NHM/ HMNEH (a sub-scheme of MIDH). The assistance is extended as subsidies to credit-linked projects @ 35% of the project's capital cost in the general area and 50% in the Hilly & Scheduled area.	State Department of Horticulture
<b>Pradhan Mantri Kisan SAMPADA Yojana (PMKSY)</b>	Launched by the <a href="#">Ministry of Food Processing Industries</a> , the mission aims to create a modern and efficient supply chain to connect the farm gate with the retail outlet directly. The projects have been approved across Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Punjab, Rajasthan, Tamil Nadu, and Uttar Pradesh.	State Department of Horticulture
<b>Integrated Scheme for Agricultural Marketing (2014)</b>	Initiated by the Department of Agriculture and Cooperation, the primary objectives of ISAM are to promote agricultural marketing infrastructure, create scientific storage space, promote pledge financing to increase farmers' income, catalyse private investment, and facilitate training, research, and development. A substantial portion of the budget was allocated to Agricultural Marketing Infrastructure, Marketing Research and Information Network and Strengthening of Agmark Grading Facilities; Small Farmers Agribusiness Consortium (SFAC), to implement the sub-scheme of Agri-Business Development. Apart from these schemes, the Chaudhary Charan Singh National Institute of Agriculture Marketing sub-scheme was envisioned to provide the required training, research and consultancy.	State Agricultural Marketing Departments



INITIATIVES/POLICY AND LAUNCH YEAR	OVERVIEW OF THE INITIATIVE IN THE COLD-CHAIN CONTEXT	IMPLEMENTING AGENCY IN THE STATE
<b>NABARD Warehouse/ Cold Storage Scheme</b>	<p>Under this scheme, loans are provided for projects involving:</p> <ul style="list-style-type: none"> <li>• Creation of storage infrastructure, with a minimum capacity of 5,000 MT, for agricultural and allied produce, including the construction of Warehouses, Silos, Cold storage, Controlled Atmosphere (CA) stores, other cold-chain activities like reefer vans, bulk coolers, etc</li> <li>• Modernisation/improvement of the existing storage infrastructure projects.</li> </ul>	National Bank for Agriculture and Rural Development
<b>Cold Storage and Fruits &amp; Vegetables Development Program</b>	<p>Under this scheme, NCDC:</p> <ul style="list-style-type: none"> <li>• Provides financial assistance to the extent of 90% of the block cost to the State Governments for setting up/modernisation/ expansion/ rehabilitation of cold storage and Ice plants by cooperatives.</li> <li>• Has dovetailed its cold storage programme with National Horticulture Board (NHB). In such cases, the quantum of assistance provided by NCDC is reduced by the subsidy available under the Capital Investment Scheme (CIS) of NHB.</li> </ul>	National Cooperative Development Corporation
<b>Mega Food Park Scheme</b>	<p>Launched by the Ministry of Food Processing, this scheme aims to establish a "direct linkage from farm to processing and then to consumer markets" through a network of collection centres and primary processing centres. This scheme provides:</p> <ul style="list-style-type: none"> <li>• A capital grant at the rate of 50% of the eligible project cost in general areas (which excludes North Eastern regions such as Sikkim, Himachal Pradesh, Jammu &amp; Kashmir and Uttarakhand) is subject to a maximum of USD 7 million per project.</li> <li>• Supports infrastructural facilities for food processing &amp; allied industries along with the value chain from the farm to market, including creating infrastructure near the farm, transportation, logistics, and centralised processing centres.</li> <li>• As of June-2020, there are 19 operational Mega Food Parks.</li> </ul>	State Industrial Development Authority

INITIATIVES/POLICY AND LAUNCH YEAR	OVERVIEW OF THE INITIATIVE IN THE COLD-CHAIN CONTEXT	IMPLEMENTING AGENCY IN THE STATE
<b>Agriculture Infrastructure Fund</b>	<p>Launched by the Ministry of Agriculture &amp; Farmers Welfare, AIF aims to provide:</p> <ul style="list-style-type: none"> <li>• Medium - long term debt financing facility for investment in viable projects for post-harvest management Infrastructure and community farming assets.</li> <li>• For setting up cold stores and chains, warehousing, grading and packaging units, e-marketing points linked to e-trading platforms, and PPP projects for crop aggregation sponsored by central/state/local bodies.</li> </ul>	
<b>Venture Capital</b>	<p>SFAC extends venture capital assistance in the form of equity to agribusiness projects. The quantum of SFAC support is 26% of the promoter's equity in the general area and 40% of the promoter equity. This venture capital is repayable to SFAC after the repayment of the term loan.</p>	Small Farmer Agri-Business Consortium (SFAC)



### 3.3. DRAFT NATIONAL LOGISTICS POLICY

The draft discussion document on National Logistics Policy released by the Department of Commerce on February 5, 2019, aims at creating a single point knowledge and information sharing platform for all logistics and trade facilitation matters in the country. The policy aims to reduce the cost and complexities involved in the logistics operation by streamlining the guidelines and addressing the constraints faced by the supply side in the cold-chain sector to achieve the following objectives:



**01** To drive the logistics cost as a percentage of GDP down from estimated current levels of 13-14% to 10% in line with best-in-class global standards and incentivise the sector to become more efficient by promoting integrated development of logistics.



**02** To optimise the current modal mix (road-60%, rail-31%, water-9%) in line with international benchmarks (25-30% share of road, 50-55% share of railways, 20-25% share of waterways) and promote the development of multimodal infrastructure.



**03** To double employment in the logistics sector by generating additional 10-15 million jobs, focusing on enhancing skills in the sector, and promoting gender diversity.



**04** To reduce losses due to Agri-wastage to less than 5% through effective Agri-logistics involving access to cold-chain, packaging, and other post-harvest management techniques, enhancing agriculture price realisation and farmer income.

In the cold-chain sector, the draft policy focuses on critical projects to drive an optimal modal mix and enable the first mile and last-mile connectivity. It also proposes Multimodal Logistics Parks (MMLPs), which are envisioned to be key production and consumption centres. The focus will be given to perishable commodities, considering the specialised nature of their packaging, transportation, and storage requirements. The Logistics Wing will work with the Ministry of Food Processing Industries, Ministry of Consumer Affairs, Food & Public Distribution and the Departments of Horticulture in respective states to identify critical policy interventions and infrastructure enhancement penetration of cold-chain facilities and adoption of reefer trucks in strategic locations. Furthermore, the Logistics Wing will work with standard-setting bodies for logistics in India, such as the Bureau of India Standards, Indian Institute of Packaging, to customise the international standards and facilitate the development of relevant standards for India. It will also work to ensure that facilitation infrastructure is created to support the adoption of these standards. Furthermore, the policy also emphasises reducing the skill gap in the logistics' sector, especially technology-driven skills that include knowledge of telematics,



**Department of  
Commerce on  
February 5, 2019,  
aims at creating  
a single point  
knowledge and  
information sharing  
platform for all  
logistics and trade  
facilitation matters  
in the country**



warehouse automation, and mechatronics. In addition, the policy highlights the importance of a seamless and reliable transportation network in the e-commerce industry, proposing interventions to increase efficiencies in warehousing and policies to encourage the set-up of multimodal logistics hubs that will further enhance logistics efficiencies for e-commerce players. The Logistics Wing will, on an ongoing basis, seek feedback from the e-commerce industry and work with relevant ministries to facilitate the logistics landscape for e-commerce in India.

## 3.4. LEGISLATIONS

As the Five-Year Plans pave the path towards achieving the vision, the acts and policies are the vehicles towards its implementation. This section briefly describes the existing legislation at the national level and those in the pipeline from the storage perspective that significantly impacts the cold-chain sector.

### 3.4.1. Model Agriculture Produce and Livestock Contract Farming (Promotion and Facilitation) Act, 2018

The Model Agriculture Produce and Livestock Contract Farming (Promotion and Facilitation) Act, 2018, was enacted to integrate farmers with bulk purchasers for better price realisation with the vision to create an efficient supply chain. Farmers producer organisations (FPO's) have a significant role in promoting Contract Farming and Service Contracts amongst the farmers' groups. Highlighting the fact that out of two parties, it is essential to emphasise protecting the interests of the weaker group, the act focuses on concerns of farmers.

As its main silent feature, a provision for services contracts all along the supply chain has been mentioned along with contract farming, including the course of action from pre-production, production, and post-production. The contract for the purpose is mandated to be facilitated by the "Registering and Agreement Recording Committee" or an "Officer" at the district, taluka or block level. The act also prohibits the development of permanent structures on farmers' land and vesting of rights/title of the land in the contract farming sponsor. The intent of introducing such a contract was to ensure buying of the pre-agreed quantity of agricultural produce and safeguard farmers from market distress. Since the buyer's quality and quantity are pre-specified, the farmers get assured market for their product at their doorstep, thus reducing the marketing cost and multiple transaction costs. The agri-based firms or buyers get the opportunity to control the quality of the products they have signed up for but by providing necessary inputs and regular inspection along with perks of the fixed price.

However, since the act is promotional and facilitative and not regulatory, its lack of enforceability may result in the breach of contracts by either party with no legal consequences. On the one hand, the producers can fail to produce the pre-agreed quality and quantity of the product or delay in the delivery due to several reasons. On the other hand, the buyer may delay payment, if the product has quality issues. The act does not suggest any dispute mechanism but recommends creating Contract Farming Facilitation Groups at the village/ panchayat level for promoting and facilitating contract farming in its jurisdiction boundary.

➔ **The Model Agriculture Produce and Livestock Contract Farming (Promotion and Facilitation) Act, 2018, was enacted to integrate farmers with bulk purchasers for better price realisation with the vision to create an efficient supply chain. Farmers producer organisations (FPO's) have a significant role in promoting Contract Farming and Service Contracts amongst the farmers' groups.**

### 3.4.2 Agricultural Reform Bills in 2020

The COVID-19 pandemic and the resultant lockdown brought up challenges for the agriculture sector and impacted the livelihood of the farmers. Building on the agriculture sector's potential for enhancing its contribution to economic growth, GDP, three bills have been envisaged as long-term solutions for farmers and the sector as a whole.

- The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Bill, 2020
- The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Bill, 2020
- The Essential Commodities (Amendment) Bill, 2020

In 2019, the Standing Committee on Agriculture, Lok-Sabha, stressed that the availability of a transparent, easily accessible and efficient market is a prerequisite to ensure remunerative prices for farmers. Small and medium farmers (constituting 86% of the agricultural landholdings of the country) mostly lack access to governmental procurement facilities and APMC markets.

They face an inadequate marketable surplus, access to the nearest APMC (an average area served by APMC is around 496 sq. km. much higher than 80 sq. km. recommended by the National Commission on Farmers, 2006) and lack of transportation facilities. Although these three bills do not directly discuss/promote the development of cold-chain infrastructure, they are focused on creating better access to the producers, which is related to building better storage facilities, and quality cold-chain infrastructure. The Bills also emphasise on "quality of produce" and timely "delivery" for an integrated temperature-controlled supply chain. To gain maximum price, farmers' and sponsors would be pushed to opt for quality control measures.

Further, as a consequence of the liberalisation of agriculture trading, there would be enhanced competition at the farmers' level thereby increasing the number of service providers and creating a new market for cold-chain infrastructure in India. If we draw parallels with other welfare services (affordable housing, health insurance), similar liberalisation measures were taken to enhance delivery by de-regulating the market and providing the most vulnerable market options. The three bills introduced are briefly discussed below:

#### 3.4.2.1. The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Bill, 2020

The Bill allows any trader/farmer (including FPOs) to engage in Inter-State or Intra-State trade of scheduled farmers' produce with a farmer or another trader in a trade area. Trade areas are defined as any area or location, production, collection, and aggregation, including farm gates, factory premises, warehouses, silos, cold storages, or any other structure or places.

The Bill further promotes barrier-free trade outside the areas of:

- A. The physical premises of market yards and sub-yards run by state APMCs
- B. Other markets notified under the state APMC Acts include private market yards and sub-yards, direct marketing collection centres, and private consumer market yards managed by persons holding a license, or any warehouse, silos, cold storages or any other structure deemed market under the APMC Act.

➔ **Agriculture sector's potential for enhancing its contribution to economic growth, GDP, three bills have been envisaged as long-term solutions for farmers and the sector**

**Electronic trading platform:** The Bill provides for setting up electronic trading platforms to facilitate direct and online buying and selling of farmers' produce resulting in the physical delivery of the produce. The central government may prescribe modalities for such a platform.

**Cess/ Tax:** The state governments are prohibited from levying any market fees, cess or levy outside the APMC area. However, the Central Government may require any person owning and operating an electronic trading and transaction platform to provide information regarding the transactions.

### 3.4.2.2. The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Bill, 2020



**Small and medium farmers (constituting 86% of the agricultural landholdings of the country) mostly lack access to governmental procurement facilities and APMC markets**

This Bill provides a framework for farmers to engage in contract farming, i.e. farming as per an agreement with the buyer before sowing. The farmer sells produce to the buyer at a predetermined rate. It aims to provide a national framework on farming agreements that protect and empower farmers to engage with agri-business firms, processors, wholesalers, exporters or large retailers for farm services and sale of future farming produce at a mutually agreed remunerative price framework fairly and transparently. Such agreement may be formed between; (a) a farmer and a sponsor, or (b) a farmer, a sponsor and a third party. State governments may create a registration authority to provide for an electronic registry of these farming agreements.

**Duration of the agreement:** The minimum period shall be one crop season or one livestock production cycle. The maximum period is five years. For a period beyond five years, the agreement has to be reached between the Sponsor and the farmer.

**Pricing of farming produce:** The price to be paid for the purchase of farming produce by the Sponsor may be mentioned in the agreement. In case the price is subject to variation, the agreement must include:

- .....
- A. a guaranteed price to be paid for such products, and
- B. a clear price reference for any additional amount over and above the guaranteed price, including bonus or premium. The price may be linked to the prevailing prices in APMC market yards or any other suitable benchmark prices.

**Standards and Quality Check:** The Bill specifies the quality, grade and standards of farming produce. It stresses the requirement for the parties to enter into a farming agreement to identify a mutually acceptable quality, grade, and standards of farming produce. The parties may adopt the quality, grade, and standards compatible with agronomic and agro-climatic practices formulated by any agency of the State or Central Government. Standards of social development, food safety standards, quality, and grade of pesticides used may also be specified in the contract.

**Delivery:** The Bill specifies the manner of delivery of farming produce. The delivery of the farm produce is to be:

- A. Taken by the Sponsor at the farm gate within the agreed time,
- B. Affected by the farmer, it shall be the Sponsor's responsibility to ensure all preparations for the timely acceptance of such delivery have been made.

The Sponsor may inspect the quality of produce, or any other feature mentioned in the agreement before accepting the delivery.

**Dispute Settlement:** The Bill requires a farming agreement to provide for a conciliation board (consisting of representatives of parties to the agreement) and a conciliation process to settle disputes. At first, all disputes must be referred to the board for resolution. If the dispute remains unresolved by the board after thirty days, the Sub-divisional Magistrate (SDM) may be approached for resolution. Parties can appeal to an Appellate Authority (presided by collector or additional collector) against decisions of the SDM. Both SDM and Appellate Authority will be required to dispose of a dispute within 30 days from the receipt of the application.

### 3.4.2.3. The Essential Commodities (Amendment) Bill, 2020

The Bill seeks to increase competition in the agriculture sector and enhance farmers' income. It aims to provide stock limits on agricultural produce that can be applied only under extraordinary circumstances based on price rise. The Essential Commodities Act empowers the Central Government to notify certain commodities as essential (the list contains food items, drugs, fertilisers, and petroleum products). The government can regulate their supply as notified. The Bill provides that the Central Government regulate the supply of certain food items, including cereals, pulses, potato, onions, edible oilseeds, and oils, only under extraordinary circumstances like war, famine, inflation, and natural gas calamity of grave nature. The Bill specifies that stock limits should be imposed, based only on price rise. A stock limit may be imposed on agricultural produce only if there is:



01

100% increase in the retail price in case of horticultural produce, or



02

50% increase in the retail price in case of non-perishable agricultural food items. The increase will be calculated over the prevailing twelve months, or the average retail price of the last five years, whichever is lower.

➔ **Electronic trading platform:**  
The Bill provides for setting up electronic trading platforms to facilitate direct and online buying and selling of farmers' produce resulting in the physical delivery of the produce.



**Parties may adopt the quality, grade, and standards compatible with agronomic and agro-climatic practices formulated by any agency of the State or Central Government**

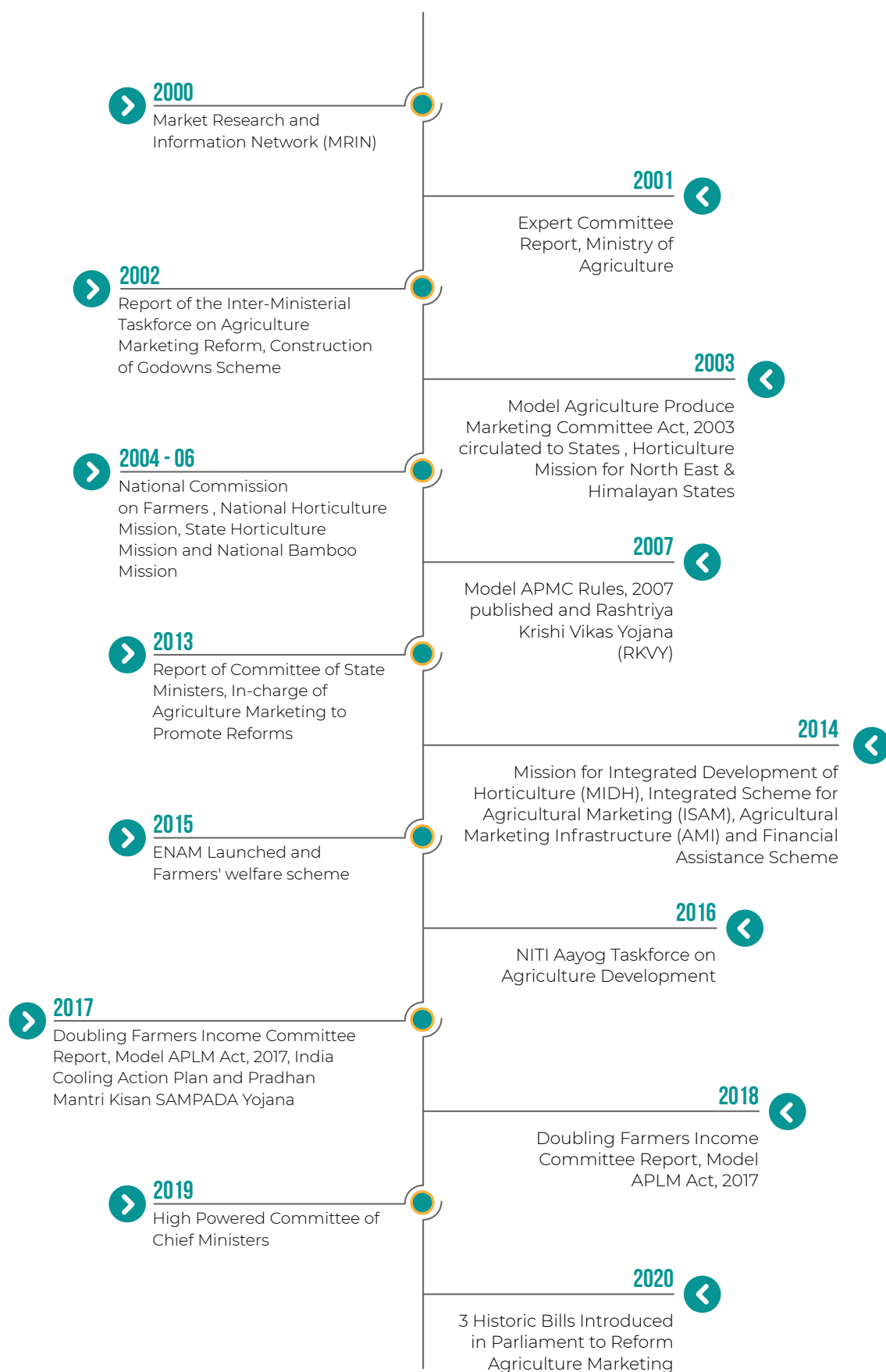


## SECTION SUMMARY

The various policies discussed in this section and their timeline of introduction is shown in Figure 4, indicating that the emphasis on development of the cold-chain is very recent. Post 2000s, several market reforms coupled with economic stimulus presented a favourable environment for addressing the gap in post-harvest needs in the horticulture sector. Further, various scattered efforts (and organizations) were initiated to focus on the significant gap in India's cold-chain infrastructure with the introduction of schemes such as Construction of Godown Scheme, MIDH and Pradhan Mantri Kisan Sampada Yojana. Additionally, more recent interventions such as the ICAP, the draft logistic policy and the three farm bills launched address the limitations of the pre-2000s policies indicated in the earlier section. However, bringing reforms to build more climate friendly cold-chain infrastructure. the government must work together with private and civil society organizations to ensure the best outcome.



**Figure 4: Recent reforms that shape cold-chain infrastructure in India**





# CONCLUSION AND WAY FORWARD



**India is the second-largest producer of fruits and vegetables globally, with fruit production of 92 MT and vegetable production of 178 MT**

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India is the second-largest producer of fruits and vegetables globally, with fruit production of 92 MT and vegetable production of 178 MT. The food loss in fruits is around 25-30%, mainly owing to the limited availability of cold-chain infrastructure. Most reports and literature highlight this lack of cold-chain infrastructure. However, little has been said around 'Why this is so?'. This report provided a brief context on the need for cold-chain infrastructure in India, discussing the various institutional actors and policies (programmes, missions, schemes, etc.) that have contributed to its development. Cold-chain is a cross-sectoral infrastructure governed by multiple ministries and is funded through various schemes, as discussed in sections 2 and 3.

However, upon further investigating the schemes mentioned above, and the institutional actors involved, it was found that there is a disconnect between their formulation and ground implementation. For instance, in Figure 2, one can observe the top-down approach of policy implementation, with the Central Government playing an essential role in policy formulation and decision-making. However, the financial institutions and other implementation bodies like NABARD, FPOs, KVKs that interact with the end-users at the local level hardly contribute to policy formulation. Further, the Ministry of Finance and Ministry of Rural Development are essential institutions and play a crucial role in facilitating policy implementation and realising schemes at the grass-root level, but are often not captured in the institutional mapping. Hence, for the advancement of cold-chain infrastructure, all the ministries need to collaborate with the amalgamation of top-down and bottom-up approaches.

Moreover, the implementation of cold-chain development is a state matter. However, at present, the state actors/stakeholders do not have much say in policy formulation and decision-making. Additionally, it is observed that private players can be an essential partner in facilitating cold-chain infrastructure development but have a restricted role in its development. Therefore, it is necessary to highlight that developing and supporting public-private partnerships is critical for scaling up cold-chain infrastructure in India.

The Central Government has provided massive technology/resources and financial aid to the producers through launching schemes, policies, etc. However, a study of the Five-Year plans, policies and missions indicate that

the plans/policies largely focus on food production rather than maintaining the quality of food produced. Therefore, policies/guidelines on developing and maintaining cold-chain infrastructure came into the picture much later. For instance, the term 'cold-chain' was introduced in the 1985-1990 Five-Year Plan. Until then, several schemes launched facilitating the development of various elements of cold-chain such as storage facilities and warehousing. But, integrated development of cold-chain needs was never mentioned specifically. Figures 3 and 4 highlights that a number of schemes/policies have been launched in the last two decades.

Based on these findings, below are some recommendations for building an energy-efficient and sustainable cold-chain infrastructure in India.

1. Push towards developing energy-efficient cold-chain infrastructure through policies, in collaboration with stakeholders such as private organisations: The present picture of cold-chain infrastructure has changed a lot owing to the dedicated efforts of various ministries, autonomous bodies, financial institutions, research and development institutions, private players and local support organisations through implementing policies, programmes and legislatures. These policies and legislations act as a catalyst to attract private sector investment and provide a positive push to the agriculture sector and associated stakeholders to contribute to cold-chain infrastructure development.

Recently, the government has announced INR 1 lakh crore (USD 13.18 billion) Agri Infrastructure Fund for farm-gate infrastructure for farmers. A portion of this investment will also focus on the lack of adequate cold-chain and post-harvest management infrastructure in farm-gate vicinity, causing gaps in value chains. Moreover, the current cold-chain infrastructure evaluation shows that around 90% of the cold-chain infrastructure is yet to be developed to manage agricultural produce adequately. These factors point to the fact that there is ample opportunity for the country to strategically manage the growth of its upcoming infrastructure in a way that is energy-efficient and sustainable and require:

- A. Situational assessment of cold-chain linkages in agriculture and allied sectors in select states and its impact on energy consumption, livelihood, jobs and other socio-economic aspects;
- B. Identification of the various stakeholders and partners that may play an essential role in the Cold-Chain development and accordingly develop business and financial models to attract more significant investment, research & development and facilitating entrepreneurship for industries manufacturing construction materials, cooling and refrigeration equipment as well as across the agriculture supply chain to support various ongoing government schemes; and
- C. Policy and regulatory recommendations at the state level to replicate and scale-up energy-efficient cold-chain interventions in line with agricultural reform bills.

2. Development of standards for cold-chain elements: Globally, various standards have been developed for different parts of the logistics value chain concerning packaging, warehousing and transportation. For example, ASTM standards on packaging, AWSA Certified Warehousing Standards in Canada etc. These standards assure consistent service levels and quality of goods to the end-user and eventually drive logistics efficiency. In India, however, there is low adoption of these standards primarily because they are not market-driven. Moreover, even existing standards in warehousing, such as the WRDA, have had limited acceptability due to low awareness of the standards and lack of tangible benefits to the players. The draft National Logistics Policy recognises this challenge and proposed to work in collaboration with various ministries (such as the Ministry of Food Processing Industries, Ministry of Consumer Affairs,

→ **Study of the Five-Year plans, policies and missions indicate that the plans/policies largely focus on food production rather than maintaining the quality of food produced**



Food & Public Distribution and the Departments of Horticulture) in respective states to establish and operationalise the standards to further the cold-chain development in India.

Promote research and development to build a holistic and climate-friendly cold-chain in India: The present-day cold-chain is not limited to developing cold storages and packhouses but requires to be constructed holistically. Thus, the government must collaborate with research institutes such as universities, think tanks, and other government and private institutes to help build a green yet affordable cold-chain in India. The collaboration should focus on developing energy-efficient and affordable technology and developing financing models that can be used to commercialise pilot projects and identify efficient transportation routes (shift to rail, coastal shipping and inland waterways and improving vehicle utilisation).

















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