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FICCI 100 100 YEARS OF BUILDING TOMORROW

Transforming India's logistics ecosystem

Warehousing, cold chain and role of technology

March 2026





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Forewords

Foreword by FICCI

I am pleased to present the **FICCI–Grant Thornton Bharat** report, which provides an important perspective on the evolving logistics, warehousing, and cold chain ecosystem in India. The sector is witnessing rapid transformation, supported by rising trade volumes, expanding manufacturing activity, and the growth of e-commerce and consumption-led supply chains.



As India strengthens its position in global value chains and domestic demand continues to scale, building efficient and more resilient logistics infrastructure will be critical to enabling sustainable economic growth.

Modern warehousing infrastructure, reliable cold chain networks, the digitalisation of operations through unified platforms, and seamless multimodal connectivity will play a pivotal role in reducing logistics costs in India. These developments will strengthen supply chain resilience and enable faster, more reliable movement of goods across the country.

Seamless **farm-to-port and plant-to-pharmacy supply chains** must now be viewed as central to India's economic competitiveness, rather than as a specialised logistics segment. By strengthening integrated cold and dry chain infrastructure, India can position itself as a leader in **climate-smart, digitally enabled logistics solutions for the Global South.**

The Government of India has undertaken a series of strategic initiatives to accelerate this transformation and create a more integrated logistics ecosystem. Flagship programmes such as **PM GatiShakti** and the **National Logistics Policy** are enabling coordinated infrastructure planning and improving multimodal connectivity, while the **Unified Logistics Interface Platform (ULIP)** is advancing digital integration across the logistics value chain. Complemented by investments in **Dedicated Freight Corridors, multimodal logistics parks, and port modernisation initiatives,** these efforts are laying the foundation for a more efficient, transparent, and globally competitive logistics network.

This report provides an overview of India's warehousing and cold chain landscape, highlighting current capacity, sectoral demand patterns, and key infrastructure gaps. It also outlines global best practices and strategic recommendations to improve logistics efficiency through technology adoption, infrastructure modernisation, and policy support. I hope the insights presented here will contribute meaningfully to ongoing discussions among policymakers and industry leaders as India continues to build a more resilient and future-ready logistics network.

Rizwan Soomar

Chairman, FICCI Committee on Logistics
CEO & Managing Director – Subcontinent, Central Asia, Levant and Egypt, DP World

Foreword by FICCI

India stands at a defining moment in its economic journey. As the country advances towards Viksit Bharat 2047 and strengthens its position as a global manufacturing and consumption hub, logistics can no longer be viewed as a back-end support function. It is strategic economic infrastructure - connecting farms to markets, factories to ports, businesses to consumers, and India to global value chains.



Those of us who have spent decades building this sector have witnessed its remarkable evolution. Indian logistics has moved from a fragmented, cost-heavy system to one that is becoming increasingly organised, institutional and technology-enabled. What was once seen largely as storage infrastructure is now emerging as a network of integrated industrial and logistics parks, multimodal corridors, digitally connected supply chains, and agile last-mile distribution systems. This structural shift is essential if India is to deliver the scale, speed, resilience and competitiveness that its next phase of growth will demand.

The FICCI-Grant Thornton Bharat report, 'Transforming India's Logistics Ecosystem', comes at an important juncture. It shifts the conversation from capacity creation to system effectiveness. Its central message is both timely and compelling: India's logistics future will be defined not only by the assets we build - roads, railways, warehouses, cold storages and logistics parks - but by how intelligently these assets are planned, integrated and operated. That is where PM Gati Shakti, the National Logistics Policy, ULIP, Dedicated Freight Corridors and multimodal planning become transformational - not as isolated initiatives, but as enablers of a more seamless national logistics architecture.

The report also brings welcome focus to the modernisation of warehousing and cold-chain infrastructure. Equally significant is the report's forward-looking perspective on technology. The next frontier of logistics competitiveness will be shaped by AI-driven forecasting, digital twins, IoT-enabled monitoring, control towers, automation, robotics, and clean-energy cold-chain solutions. These are no longer futuristic concepts. They are becoming practical levers for higher efficiency, better visibility, faster decision-making and more resilient operations. India has a unique opportunity to leapfrog legacy models and build a logistics ecosystem that is not only larger, but smarter, greener and more inclusive by design.

As an industry, we must now think beyond isolated assets and individual enterprises. We must build integrated logistics ecosystems where data flows as seamlessly as cargo, multimodal choices become operationally viable, cold-chain integrity is maintained end-to-end, and enterprises of every scale can access world-class infrastructure. That is how logistics will become a force multiplier for manufacturing competitiveness, agricultural value addition, export growth and inclusive development.

I congratulate FICCI and Grant Thornton Bharat for producing a report that is thoughtful, relevant and action-oriented. I am confident it will serve as a valuable reference for policymakers, industry leaders, investors and practitioners working together to build a more integrated, technology-enabled and globally competitive logistics ecosystem for India. If India must grow with speed, resilience and sustainability, logistics will not merely support that ambition - it will help define it.

Anshuman Singh
Co-Chair, FICCI Committee on Logistics
CEO & Managing Director, IndoSpace

Foreword by FICCI

I am pleased to share this **FICCI–Grant Thornton Bharat** report, which examines the evolving logistics, warehousing and cold chain ecosystem in India. As supply chains grow in scale and complexity, the logistics sector is becoming a strategic driver of productivity and trade competitiveness, supporting the efficient movement of goods across increasingly dynamic markets.



While investments in physical infrastructure remain essential, the future of logistics will also be shaped by the integration of advanced technologies. Solutions such as intelligent warehouse management systems, IoT-enabled asset monitoring, digital freight platforms and integrated supply chain control towers are transforming the way logistics networks are planned, managed and optimised. These innovations are enabling greater visibility, improved asset utilisation and more responsive, data-driven logistics operations.

Technology is also playing a critical role in advancing sustainability and efficiency across supply chains. Energy-efficient facilities, digital route optimisation, electrified mobility solutions and innovations in cold chain management are helping reduce environmental impact while improving operational performance. The report highlights emerging trends shaping the sector—including the growing adoption of automation, advancements in cold chain technologies and the development of integrated multimodal logistics hubs—while drawing on global best practices and policy initiatives that can accelerate the adoption of technology-enabled logistics solutions.

With initiatives such as the PM Gati Shakti National Master Plan and the National Logistics Policy providing a strong foundation for integrated infrastructure planning and digital coordination, collaboration between industry, technology providers and policymakers will be critical in building a smarter and more resilient logistics network. I hope this report serves as a valuable resource for stakeholders working towards a more efficient, technology-driven and future-ready logistics ecosystem for India.

Pali Tripathi

Co Chair, FICCI Committee on Logistics
CEO, Taabi Mobility Limited (RPG Group)

Foreword by Ministry of Food Processing Industries, Government of India

India's farmers, food processors and logistics stakeholders remain at the heart of the nation's agricultural transformation. Their resilience and innovation continue to drive our collective mission of building a modern, efficient and globally competitive Agri value chain.



India's food processing and logistics ecosystem is at a defining inflexion point. As one of the world's largest food producers, achieving 353.96 million tonnes of foodgrain production in 2024–25, the nation must now complement this scale with an equally robust and technology-enabled supply chain. The imperative is clear: to create systems that minimise post-harvest losses, enhance value realisation for farmers, and ensure food quality and safety for consumers. Despite notable progress, critical challenges persist, including inadequate scientific storage, limited temperature-controlled capacity, low automation levels, and fragmented supply chain linkages. Addressing these bottlenecks is essential to strengthening India's logistics and cold chain backbone.

The Government of India has adopted a comprehensive, multidimensional approach to address these structural gaps. Flagship interventions, including PMKSY, AIF, Operation Greens, and the world's largest grain storage plan at PACS, have accelerated the creation of cold chain capacity, modern packhouses, and scientific post-harvest infrastructure across the country.

India today hosts 8,815 cold storages with a combined capacity of 402.18 lakh MT, with further expansion expected as investments scale up. Complementing this, transformational reforms under PM Gati Shakti and the National Logistics Policy have enabled integrated multimodal planning across 46 ministries, 36 States and Union Territories, and 1,652 planning layers. This has facilitated data-driven infrastructure development, optimised logistics corridors, and progressively reduced logistics costs towards global benchmarks of 8 to 9% of GDP. These reforms are supported by high-capacity freight corridors, improved inland waterways, and modern warehousing standards.

The momentum is further strengthened by the Union Budget 2026–27, which allocates INR 12.2 lakh crore toward infrastructure logistics and warehousing development, including advanced cold chain networks and green logistics solutions. This investment reflects the Government's long-term vision to build a modern, resilient, sustainable, and globally competitive food processing ecosystem.

In this context, this knowledge report provides timely insights. The report presents data-backed analysis, sectoral trends, and emerging opportunities to guide policymakers, industry stakeholders, investors, and supply chain leaders in shaping India's next phase of logistics and cold chain development. It serves as a strategic resource to support informed decision-making and the adoption of future-ready, technology-driven, and multimodal infrastructure models.

The Ministry remains committed to an ecosystem that enhances farmers' incomes, improves food safety, boosts agri-exports, and strengthens India's global competitiveness. Through collaboration among government, industry, academia and technology partners, we can build a logistics and cold chain network that reduces inefficiencies, elevates value addition, and contributes meaningfully to India's economic growth.

D. Praveen

Joint Secretary, Ministry of Food Processing Industries, Government of India

Foreword by Grant Thornton Bharat

India's next phase of development will depend heavily on the strength and efficiency of its logistics ecosystem. The ability to move goods seamlessly across manufacturing, retail, agriculture, pharmaceuticals, and e-commerce supply chains will shape the country's global competitiveness. Today, climate volatility, shifting consumption patterns, and the scale of production demand logistics systems that are not just larger, but smarter and more resilient.



This shift is being driven by technologies such as AI-based routing and demand forecasting, digital twins for network planning, IoT-enabled visibility across multimodal corridors, and robotics-powered automation in scientific warehouses, alongside stronger Fleet & Transport Management (FTM) systems that ensure reliable movement across first, mid, and last-mile networks. As India expands traditional infrastructure such as cold-chain networks and modern storage, the real opportunity lies in integrating intelligent systems that improve efficiency, lower emissions, and future-proof the country's logistics backbone.

This knowledge paper shifts the narrative from capacity creation to system effectiveness. Through utilisation analytics, corridor-level mapping and infrastructure diagnostics, it identifies critical bottlenecks ranging from limited precooling penetration and insufficient farm-gate aggregation to gaps in multimodal cold movement, automation readiness and temperature-integrity across modes.

The Government of India sets the foundation for this shift. PM Gati Shakti is enhancing alignment between warehousing clusters, transport corridors, and multimodal interfaces. The National Logistics Policy is strengthening regulatory and digital integration. The expansion of Dedicated Freight Corridors, inland waterways, and Multi-Modal Logistics Parks improves long-haul reliability. The Union Budget 2026–27, with INR 12.2 lakh crore in public capital expenditure and INR 5.98 lakh crore directed toward transport and logistics, particularly MoRTH and multimodal linkages, reaffirms the national commitment to building a future-ready logistics architecture.

In the context of ongoing disruptions arising from the West Asia conflict, an integrated logistics architecture provides India with the agility to reroute cargo, shift modes, and protect supply chain reliability. Control tower visibility, multimodal substitution, and cold chain integrity allow exporters and operators to minimise delays, manage risk, and maintain service stability, even in volatile global corridors.

The next decade, however, will hinge on private operators' ability to operationalise these enablers. The transition from capacity addition to capacity optimisation will require automation-enabled Grade-A parks, grey shells that compress go-live timelines, and integrated cold-chain networks linking precooling units, packhouses, cross-docks, multitemperature hubs and reefer fleets into a ULIP-integrated operational view. Real-time control towers, Digital Twin-based validation, and energy-performance KPIs will be essential for reducing spoilage, improving resource utilisation, and lowering operating costs. Equally important is the provision of interoperable platforms that allow FPOs and SMEs to access compliant infrastructure—ensuring scalability, inclusivity and system coherence.

As India progresses toward its 2047 vision, the logistics and cold-chain ecosystem must evolve into a purpose-designed network rather than a collection of isolated assets. Strategic alignment of DFC gateways with perishables cross-docks, the positioning of MMLPs for farm-to-port flows, the expansion of EV-based last-mile systems and the integration of AI-driven predictive decisioning will be essential to reducing losses, stabilising service levels and enhancing export competitiveness. This thought leadership articulates the insights, priorities and execution pathways required to build a resilient, globally competitive and future-ready logistics backbone for India.

Chirag Jain
Partner and Food Processing Industry Leader
Grant Thornton Bharat



01

State of logistics, warehousing and cold chain in India

India's logistics transformation under PM Gati Shakti

India's logistics sector is entering a new phase of structural change, driven by rising consumption, expanding manufacturing, fast-growing e-commerce, and the increasing movement of temperature-sensitive, high-value goods. As supply chains grow more complex, improving logistics efficiency and strengthening multimodal connectivity have become national priorities.

To address long-standing inefficiencies, the Government of India launched the PM Gati Shakti – National Master Plan (NMP) in October 2021, aimed at transforming logistics infrastructure through integrated planning, multimodal connectivity, and GIS-based asset mapping. The initiative integrates 46 ministries and 1,652 data layers into a unified planning platform to synchronise infrastructure development across road, rail, port, aviation, and urban logistics systems.[1]

Multiple government and NCAER-supported studies estimate India's logistics costs at 13–14% of GDP, with Gati Shakti expected to reduce this toward global benchmarks (8–9%). Recent government-backed assessments show logistics costs have already fallen to 7.8–8.9% of GDP, reflecting early gains from multimodal integration initiatives.[2]

Despite these reforms, structural gaps continue to constrain the logistics and cold chain ecosystem:

Fragmented infrastructure & limited multimodal integration

India's logistics infrastructure still faces coordination gaps, as reflected in the World Bank's Logistics Performance Index, which improved from rank 54 in 2014 to 38 in 2023, showing progress but remaining below global standards.

Inadequate temperature-controlled facilities

Post harvest losses in fruits range from 6.02% to 15.05%, and in vegetables 4.87% to 11.61%, primarily due to insufficient cold chain and temperature-controlled storage.[3]

Insufficient use of automation technologies

Automation uptake in India's logistics and warehousing sector remains limited, with many facilities still dependent on manual handling. This restricts smart operation, increases errors and results in higher turnaround times.

Operational fragmentation & lack of standardisation

ULIP integrates 45 systems across 11 ministries, providing access to 2,000+ data fields via 137 APIs, addressing long-standing digital fragmentation and highlighting the scale of earlier fragmentation and the significant journey ahead toward full standardisation.[4]

The NMP, supported by the National Logistics Policy (NLP), the Unified Logistics Interface Platform (ULIP), and the Logistics Data Bank (LDB), presents an unprecedented opportunity to build a future-ready, technology-integrated logistics ecosystem. These initiatives aim to enhance competitiveness, reduce logistics inefficiencies, accelerate multimodal connectivity, and enable seamless domestic and international movement of goods.

1. PM Gati Shakti Portal - Department for promotion of industry and Internal Trade
2. Assessment of logistics cost in India Report: DPIIT (September 2025)
3. Schemes to minimise post-harvest losses – PIB (5 July 2025)
4. ULIP portal

Overview of India's warehousing and cold chain infrastructure

The Government of India's assessments recognise warehousing as a core component of the national logistics system and a key contributor to overall logistics costs. The DPIIT–NCAER report Assessment of Logistics Cost in India (2025) identifies warehousing and storage as major cost elements, underscoring their central role in supply-chain efficiency and the need for modern, compliant facilities. In parallel, the PIB report 'Logistics: India's Growth Engine', highlights how national initiatives such as PM Gati Shakti, Multimodal Logistics Parks, the Unified Logistics Interface Platform (ULIP), and the Logistics Data Bank (LDB) are strengthening warehousing connectivity, enabling faster cargo movement, digital tracking, and improved multimodal access. The government also affirms that logistics, including warehousing, employs over 22 million people, reflecting its scale and economic relevance.[5]

Growth in warehousing infrastructure

The 'Logistics Ease Across Different States' (LEADS) 2024 report is based on more than 7,300 survey responses and over 750 stakeholder consultations. It shows that states are strengthening warehousing-supportive logistics systems through improved multimodal connectivity, the adoption of regional and city-level logistics plans, and the expansion of PPP-based multimodal hubs.

The report also highlights state initiatives such as the integration of PM Gati Shakti planning layers, green logistics measures, and logistics skill-development programmes, all of which are contributing to a more modern warehousing and cold-chain ecosystem. In addition, major infrastructure gains, such as the construction of 769,284 km of rural roads under the Pradhan Mantri Gram Sadak Yojana (PMGSY), have improved last-mile connectivity to warehouses and cold-chain facilities.[6]

India has **10,818** government-registered warehouses, with **7,221 valid registrations**, making this the most authoritative government-verified warehouse count in the country.[7] States such as Maharashtra and Madhya Pradesh have some of the highest numbers of registered and State Warehousing Corporation–linked facilities, supported by CWC's network of **2,205 State Warehousing Corporation warehouses** nationwide.[8] These government-certified warehouses primarily store agricultural commodities such as foodgrains, cottonseed oilcake, soybean, pulses, and oilseeds as listed in WDRA's approved commodities data, reflecting their central role in scientific storage and India's e-NWR–based pledge financing system.

Growth in cold chain infrastructure

Cold chain facilities are vital to India's food and pharmaceutical logistics, especially for reducing the post-harvest losses and enabling the movement of high-value, perishable products.

Current cold chain stock (2025)
As of 30 June 2025, India has 8,815 cold storages with a combined capacity of 402.18 lakh Metric Tonnes (MT).[9] Over the past several years, the overall capacity base has grown at a modest 2.2% CAGR and based on existing load patterns and new projects entering commissioning, this growth trajectory is expected to continue toward 2031.[10]

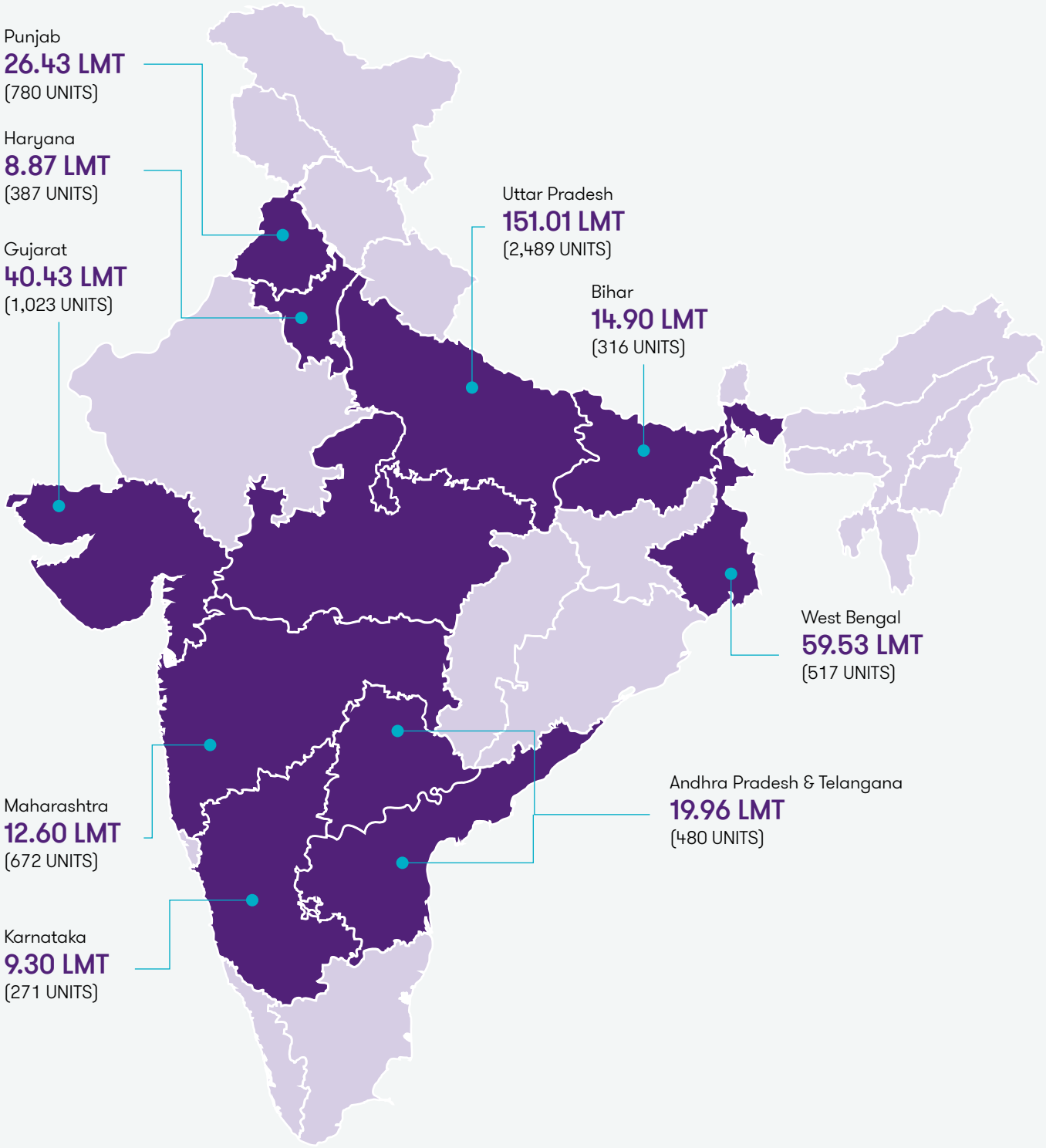
The country's cold chain assets now span a wide mix of infrastructure types: pre-cooling chambers, controlled atmosphere storage, blast freezers, and a gradually expanding fleet of refrigerated vehicles. This diversified infrastructure base is helping the sector move beyond its historic dependence on a single commodity, which is potato-centric storage.

Cold chain capacity, utilisation trends and modernisation
Since 2008, **394 cold chain projects** have been approved; 286 are completed and operational, creating **25.52 LMT preservation** and **114.66 LMT processing capacity** annually, generating 1.74 lakh jobs. Cold chains store **fruits, vegetables, dairy, meat, poultry, and fish**, with **horticulture products forming the largest share** of utilisation. The 2025 budget increase to **INR 6,520 crore** underscores the government's focus on strengthening and expanding the impact of cold chain infrastructure.[11]

The **National Centre for Cold Chain Development (NCCD)** calls for modernising India's cold chain sector through **smart cold chains, digital integration,** and **IoT enabled monitoring**, along with **energy efficient technologies** such as **solar powered cold rooms** and **electric reefer trucks** to reduce losses and improve reliability. It also prioritises **traceability systems** to ensure transparency and quality "from farm to consumer."

5. Logistics: India's growth engine report- PIB (16 August 2025)
6. Leads 2024 report: Ministry of Commerce and Industry GOI
7. WDRA Portal: Department of Food and Public Distribution
8. CWC Portal: Department of Food and Public Distribution
9. Building Resilient Infrastructure for Storage of Food Grains - PIB (28 September 2025)
10. India: NCCD reports a 2.2% compound annual growth rate in cold storage capacity - IIR (24 February 2026)
11. Integrated Cold Chain and Value Addition Infrastructure (ICCVAI) report: PIB

Top 10 states in cold storage capacity



Source: From Harvest to Home: Building Resilient Infrastructure for Storage of Food Grains - PIB (28 September 2025)
Disclaimer: Maps are for graphical purposes only. They do not represent a legal survey.

Sector wise utilisation of warehouse, cold storage and logistics

India's cold chain and warehousing ecosystem is experiencing a structural shift, driven by rising sectoral demand, policy reforms, and a growing focus on quality-compliant logistics. Understanding how demand varies across key industries is essential to assess future capacity requirements and identify emerging opportunities within the supply chain.

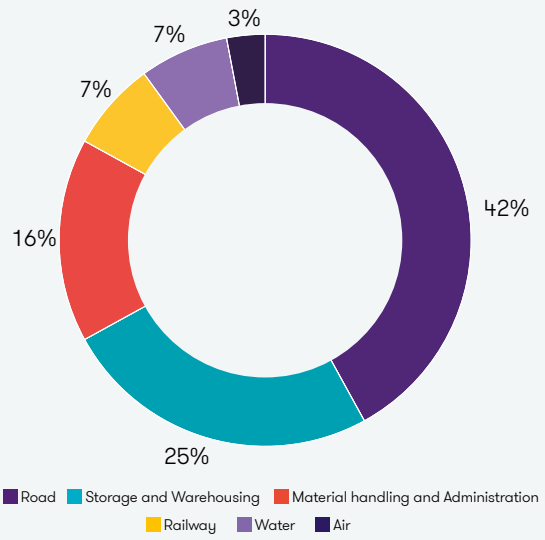
Demand drivers	Key gaps	Policy influence	Implication
Agriculture & horticulture			
• Rising high-value horticulture output and perishability risk • Need for pre cooling, pack houses, and multi commodity cold storage	• Fragmented farm gate infrastructure • Low pre cooling penetration and limited pack house density • High post harvest losses	• PMKSY and AIF are accelerating the creation of pack houses, ripening units, and reefer logistics • Push toward scientific post harvest handling	• Greater infrastructure integration and organised cold chain networks • Significant reduction in post harvest inefficiencies
Pharmaceuticals			
• Growth in vaccines, biologics, and temperature sensitive drugs • Rising need for GDP compliant logistics	• Shortage of validated cold storage • Inconsistent temperature monitoring and traceability systems	• Stricter quality audits, GDP standards, and export driven compliance	• Expansion of IoT enabled, audit ready cold chain clusters • Strengthened export grade supply chain resilience
Retail & FMCG			
Growth in organised retail, premium food categories, and multi temperature demand	• Uneven cold chain penetration across cities • Fragmented distribution architecture	Policies supporting urban logistics, retail formalisation, and digitised supply chains	• Emergence of large format, multi temperature distribution hubs • Improved SKU optimisation and omni channel fulfilment
E-commerce			
Rise of hyperlocal fulfilment, quick commerce, and high velocity delivery models	• Insufficient last mile cold storage • Variability in temperature integrity during rapid dispatch cycles	• Incentives for logistics parks, micro warehousing and urban distribution	• Development of multi tiered networks: dark stores, micro fulfilment centres, and cold last mile nodes • Better speed, freshness, and service reliability
Manufacturing			
• Expansion in electronics, automotive, and engineered goods • Need for Grade A, compliant warehousing	Legacy facilities lacking automation, mechanisation, and standardised safety	PLI schemes, industrial corridors, and manufacturing incentives are driving modern warehousing	• Shift toward automation ready, scalable, compliant warehouses • Strong impact on overall warehousing capacity

Total logistics cost (TLC) in India: An overview

India's first comprehensive, government-backed assessment of logistics costs uses a hybrid methodology combining secondary data with nationwide primary surveys to establish a reliable, globally comparable benchmark. The report estimates India's TLC for FY 2023–24 at INR 24 lakh crore, representing a significant advancement in evidence-based logistics planning.[12]

The distribution of TLC in India for FY 2023–24 indicates that road transport remains the dominant cost component at 42%, underscoring the country's strong dependence on road-based movement for freight mobility. Storage and warehousing account for 25%, reflecting the growing requirement for efficient inventory management, Grade-A facilities, and optimised warehousing networks. Material handling and administration represent 16%, pointing to operational inefficiencies and multiple touchpoints across the supply chain. Meanwhile, rail (7%), water (7%), and air (3%) contribute smaller shares, highlighting the underutilisation of more cost-effective and sustainable modes such as rail and waterways. Overall, the data shows a logistics ecosystem still heavily skewed toward road transport, resulting in higher costs and network congestion. However, India's ongoing push toward multimodal integration, digital logistics solutions, and infrastructure upgrades such as dedicated freight corridors presents a strong opportunity to shift towards a more balanced, efficient, and resilient logistics mix.

Share of components in TLC % FY 2023-24



Source: Assessment of Logistics Cost in India Report: DPIIT (September 2025)

12. Assessment of Logistics Cost in India report: DPIIT (September 2025)



Current schemes strengthening India's evolving logistics ecosystem

As India's logistics ecosystem evolves, this progress has been enabled by a series of government initiatives that collectively strengthen cold chain capacity, storage and processing infrastructure, multimodal connectivity, and digital planning systems. These schemes range from post harvest and cold chain development to financing support and integrated multimodal planning, forming the essential foundation for a more efficient and technology enabled logistics network.

Scheme	Nodal ministry/ agency	Key provisions	Achievements (As of latest dates)
PMKSY (umbrella scheme)	MoFPI	Umbrella scheme for post-harvest & food processing infrastructure, including cold chains	1,608 projects; INR 6,198.76 crore grants; 41 mega food parks, 394 cold chains, etc benefitted 34.15 lakh farmers and creating employment for over 4.33 lakh individuals.[13]
ICCVAI (component under PMKSY)	MoFPI	End-to-end cold chain infra incl. precools, CA storage, reefer	394 approved; 286 operational; INR 2366.85 crore grants
Operation Greens (component under PMKSY)	MoFPI	Value chain dev. for 22 crops; 35-50% subsidy	44 projects; INR 545.11 crore grants
Agro Processing Cluster Scheme (component under PMKSY)	MoFPI	Establishment of modern processing clusters with shared services, warehouses, cold storage, and utilities	A total of 75 agro-processing clusters projects approved
Food Testing Laboratories (FTL) (component under PMKSY)	MoFPI	Establishment of modern processing clusters with shared services, warehouses, cold storage, and utilities	175 FTL projects reported under PMKSY mapping
CEFPPC (component under PMKSY)	MoFPI	Setting up and expanding processing units; enhancing preservation, shelf life, and value addition capacity	A total of 526 units approved/ sanctioned across India
AIF	MoA&FW	Loan facility with 3% interest subvention for warehousing, cold stores	1,13,419 projects; INR 66,310 crore sanctioned; 2,454 cold storages
AMI (ISAM)	MoA&FW/DMI	25-33.33% subsidy for storage (50-5000 MT)	49,796 storage projects; 982.94 LMT capacity; INR 4,829.37 crore subsidy
MIDH	MoA&FW	PHM infra: cold stores, packhouses, ripening, reefers	55,748 PHM assets; 11,140 marketing infra
World's largest grain storage plan (PACS)	MoC + DAC&FW + NABARD	PACS-level godowns, CHCs, processing, upgraded subsidy norms	11 PACS godowns; 9,750 MT; 22,933 PACS formed. 73,492 computerised[14]
PM Gati Shakti NMP	DPIIT	GIS multimodal planning, warehouse spatial planning	46 ministries; 36 States; 1,652 data layers; LPI rank 38 (2023)
NLP	DPIIT	Reduce logistics cost; ULIP; warehousing standards	ULIP active; 2,000+ data fields, 137 APIs; e-handbook on warehousing standards[15]

13. Press release: PIB (From Farm to Retail: Make in India's push for Food Processing Excellence Report, Mar 2025)
14. PM Gati Shakti portal
15. ULIP portal



02
Challenges and opportunities in the logistics sector

Key challenges

01 Regional cost disparities in logistics

Despite the national average logistics cost being 7.97% of GDP[16], several regions across India face significantly higher logistics costs due to uneven infrastructure and connectivity.

02 Capacity & infrastructure gaps

Cold-chain infrastructure remains limited, with around 8,815 storage facilities and a capacity of 402.1 Lakh MT.[17]

03 Fragmented supply-chain planning

Because planning was historically fragmented across departments, deep alignment gaps remain even with 1,652+ GIS layers.[18]

04 Non-standardised warehousing quality

Non-standard warehousing causes delays, higher costs, and inconsistent supply-chain performance.

05 Cold chain imbalance & reefer underuse

State-level demand mismatches persist, while refrigerated (reefer) transport remains significantly underutilised nationwide.

06 Rural post-harvest inefficiencies

Despite 55,748 post-harvest infrastructure units, fruit and vegetable losses remain high at around 6–15% and 4–12%, respectively.[19]

Key opportunities

Multimodal network integration

- PM Gati Shakti enables coordinated planning across ministries, improving corridor efficiency and reducing transit times.
- The platform integrates 46 ministries and 36 States/UTs, with 1,652 GIS layers, supporting 293 infrastructure projects worth INR 1.17 lakh crore.[20]

Logistics cost reduction via digitalisation

- Digital platforms are improving supply chain visibility, documentation speed, and multimodal routing efficiency, lowering total logistics cost.
- Logistics costs have declined to 7.8–8.9% of GDP, with ULIP integrating 2,000+ data fields and 137 APIs across ministries.[21]

Bridging infrastructural gaps through standardised design & operations

Government documents emphasise that non-standardised warehouse layouts, safety norms, and operating practices contribute to logistics delays and inefficiencies, and that standardisation will bridge these gaps.

Rapid cold chain expansion

- Rising perishables demand, food processing expansion, and pharma biologics are strengthening investment prospects in integrated cold chains.
- The 2025 budget increase to INR 6,520 crore underscores the government's focus on strengthening and expanding the impact of cold chain infrastructure.[22]

Rural storage & PACS-led infrastructure

- Decentralised storage models are strengthening rural logistics by creating aggregation centres closer to producers.
- 9,750 MT storage created under the pilot; 22,933 PACS registered; 73,492 PACS computerised under the national programme.[23]

E-commerce and urban distribution growth

Q-commerce and hyperlocal models are scaling demand for micro-warehouses, dark stores, and small cold hubs in cities.

16. Assessment of logistics cost in India report: DPIIT (September 2025)
17. Building Resilient Infrastructure for Storage of Food Grains - PIB (28 September 2025)
18. PM Gati Shakti portal- DPIIT
19. Schemes to minimise post-harvest losses – PIB (5 July 2025)
20. Ministry of Commerce & Industry – PIB (05 August 2025)
21. ULIP portal
22. Integrated Cold Chain and Value Addition Infrastructure (ICCVAI) report: PIB
23. World's Largest Grain Storage Plan in Cooperative Sector report: PIB (Mar 2025)



03
Drivers of logistics efficiency

India's supply-chain performance is accelerating on two parallel flywheels: (1) more standardised, automation-ready warehousing that reduces dwell time and improves throughput; and (2) stronger multimodal connectivity (rail–road–ports–waterways) coordinated through digital planning platforms such as PM Gati Shakti and ULIP. Together, these enablers compress lead times, reduce total landed costs, and stabilise service levels, particularly for manufacturing, 3PL, and temperature-controlled supply chains.

Role of warehousing

Grade A warehousing

Particulars	Description
Strategic thesis	India is shifting from basic storage facilities to high-performance logistics infrastructure. Grade-A warehouses offer higher throughput, automation readiness, stronger safety compliance, and predictable service levels, making them essential for modern supply chains.
ICCVAI (component under PMKSY)	• Goods and Services Tax (GST) unified the tax regime, enabling companies to replace multiple state-level warehouses with larger, more efficient regional hubs. • The National Logistics Policy and formal warehousing standards set clearer benchmarks for structural integrity, fire safety, environmental compliance, and layout design. • Infrastructure expansion, such as the Dedicated Freight Corridor (96.4% operational) and the Bharatmala highway programme, has opened new high-connectivity locations for large-format logistics parks. • Global and domestic institutional investors are funding large, master-planned Grade-A logistics parks across major cities.
Value levers & unit economics impact	• Standardised pallet and racking norms improve storage density and throughput. • BIS-aligned floor and safety specs reduce damages and improve accuracy. • Defined dock and layout standards cut truck dwell time significantly. • Digital-ready infrastructure supports automation and lowers INR/order.[24]
KPIs/leading indicators (India)	• Grade-A warehouse stock expanded from 88 million sq. ft to 238 million sq. ft (2019–2024).[25] • 50.4 million sq. ft of warehouse space was absorbed in 2024, the highest on record. • Vacancy rates declined to around 7% by Q1 2025. • About 80% of total net leasing in 2024 occurred in Grade-A facilities.
Execution risks & mitigations	**Risk:** Rental escalation due to limited vacancy. **Mitigation:** Long term leasing strategies, early renewals, and mixed portfolios combining core assets and flexible spaces.

Grey warehousing (ready to lease shells; faster go live)

Particulars	Description
Strategic thesis	Ready shell (grey) warehousing provides pre built, fully compliant structures that customers can quickly customise. It functions like on demand logistics capacity, ideal for fast growing sectors.
ICCVAI (Component under PMKS Y)	• Developers are creating pre approved, infrastructure ready Grade A buildings, where only interior fit outs (racking, mezzanines, automation zones) need to be installed. • This model is particularly attractive to fast moving sectors such as third party logistics, e commerce fulfilment, and consumer electronics.
Value levers & unit economics impact	• Go-live cycle slashed from 9–12 months to 2–6 weeks. • Lower project risk, as developers bear approval/land risk. • Reduces upfront capex for tenants; improves cash conversion cycle
KPIs/leading indicators (India)	Increased usage in major Grade A clusters, reflected in tight vacancy levels (~7%) and strong leasing momentum.
Execution risks & mitigations	**Risk:** Structural features may not meet the advanced automation requirements of some tenants. **Mitigation:** Developers are adopting standardised high spec templates and conducting joint engineering sessions with customers early in the design process.

24. Reference document for standardisation of warehousing and related assets: Ministry of Commerce and Industry
25. e-Handbook on warehousing standards 2025: DPIIT

Automation and robotic material handling

Particulars	Description
Strategic thesis	Supply chains are shifting from labour dependent operations to technology driven fulfilment, where automated systems deliver consistent speed, accuracy, and efficiency.
What was done (India policy/capex/operating model)	• Indian warehouses are adopting conveyor and sortation systems, Automated Mobile Robots, Automated Guided Vehicles, Automated Storage and Retrieval Systems (AS/RS), and machine vision based picking and labelling technologies. • Companies are adopting Robotics-as-a-Service (RaaS) models, lowering upfront capital requirements.
Value levers & unit economics impact	• Higher lines per labour-hour reduce the cost per line handled. • Lower pick-error rates lead to fewer customer complaints and returns. • Greater storage density through AS/RS reduces the overall warehouse footprint cost. • Predictable throughput ensures consistent performance and minimises dependency on labour variability.
KPIs/leading indicators (India)	Standardised warehousing norms mandate BIS aligned pallet, racking, and MHE specifications, ensuring automation readiness across India's logistics infrastructure.
Execution risks & mitigations	**Risk:** Integration issues between warehouse management software and automated hardware. **Mitigation:** Use of phased deployment, digital test environments, and Robotics as a Service pilots to refine systems before full rollout.

Last-mile delivery transformation (micro-fulfilment + EV fleets)

Particulars	Description
Strategic thesis	Urban logistics is being redesigned around proximity and electrification, enabling faster deliveries at lower operating costs and reduced environmental impact.
What was done (India policy/capex/operating model)	• Rapid adoption of electric two wheelers, electric three wheelers, and electric light commercial vehicles for last mile delivery • Growth of micro fulfilment centres and dark stores closer to population centres
Value levers & unit economics impact	• EVs have a lower per kilometre operating cost than ICE vehicles, especially on dense urban routes. • Faster delivery windows help retain customers. • EVs benefit from lower maintenance and emerging low emission regulations.
KPIs/leading indicators (India)	• NITI Aayog's India Electric Mobility Index highlights that several states have emerged as leaders in electrifying three-wheelers, supported by state EV policies, charging network expansion, and regulatory incentives that have made 3Ws one of India's most advanced clean mobility segments. • Electric three-wheelers accounted for 57% of total three-wheeler sales in FY2025, with around 699,000 units sold.
Execution risks & mitigations	**Risk:** Limited EV range, charging infrastructure gaps, and route inefficiencies may disrupt delivery timelines and increase operational costs in dense urban areas. **Mitigation:** Optimise delivery routes, co-locate charging infrastructure with micro-fulfillment centers, and scale EV adoption in priority urban clusters.

Multimodal connectivity (planned as one network)

Particulars	Description
Strategic thesis	India is building a unified, high speed multimodal logistics system where rail, highways, and waterways are supported by a national digital platform, lowering friction and reducing logistics cost.
What was done (India policy/capex/operating model)	• Dedicated Freight Corridor: 96.4% of the 2,843-km network has been commissioned, enabling high-speed freight movement • The Unified Logistics Interface Platform (ULIP) integrates logistics data from government systems through 137 application programming interfaces (APIs) • Bharatmala highway expansion has increased the national highway network by about 60% since 2014 • Inland waterways are expanding, offering low-cost bulk freight movement
Value levers & unit economics impact	• Shifting freight to lower cost modes like rail and waterways reduces line haul expenses. • Lower transit variability reduces safety stock needs and cuts inventory costs. • Better placement of logistics nodes shortens middle mile distances and improves efficiency.
KPIs/leading indicators (India)	• Freight trains on the corridor increased from 247 per day to 352 per day • Inland waterway cargo reached 145.5 million metric tonnes in fiscal year 2024–25
Execution risks & mitigations	**Risk:** Congestion at terminals and missing first mile/last mile links. **Mitigation:** Development of multimodal logistics parks, private rail sidings, and digital time slot systems through the national logistics platform.

Cold chain innovation (Thermal battery technology and national cold chain projects)

Particulars	Description
Strategic thesis	Create a modern, reliable, energy efficient cold chain that minimises spoilage in agriculture and pharmaceutical supply chains and enables long distance temperature controlled movement.
What was done (India policy/capex/operating model)	• Container Corporation of India introduced IceBattery thermal storage technology (phase-change material) in February 2026, enabling diesel-free cooling for rail and road containers. • Pradhan Mantri Kisan Sampada Yojana (PMKSY) supports the construction of cold storages, packhouses, reefer vehicles, and food processing units nationwide.
Value levers & unit economics impact	• Zero diesel operation brings major operating cost savings. • Stable temperature during delays reduces spoilage risk. • Enables rail based cold chain, lowering long haul costs and emissions.
KPIs/leading indicators (India)	• IceBattery launched in February 2026 for national deployment. • Under the national cold chain program, 1,601 projects approved, 1,133 completed, including 394 cold chain projects of which 286 are operational.
Execution risks & mitigations	**Risk:** Slow adoption due to new technology. **Mitigation:** Pilot lanes with anchor customers, dedicated training, and government capital support under national schemes.





04

Emerging technologies and global best practices in logistics

India's logistics and warehousing ecosystem is entering a phase where AI-driven automation, digital public platforms, zero-emission refrigeration, and global-standard multimodal hubs are becoming foundational. The following section highlights new-age technology solutions and international best practices shaping next-generation logistics.

New-age technology solutions



AI and agentic AI in warehousing

AI in logistics functions by analysing patterns in freight, demand and inventory to automate decisions, while agentic AI goes further by autonomously adjusting routes, storage, and operational flows based on real time conditions rather than preset rules.

Its value lies in bringing predictability and coordination to a sector long affected by delays and fragmented information, a challenge noted across studies assessing India's logistics performance. The government has strengthened this shift by creating unified digital systems under the National Logistics Policy called ULIP which provide real time visibility across ports, rail and road networks. This integration has given AI consistent and interoperable datasets, enabling early detection of bottlenecks, smoother multimodal transitions, and more synchronised movement of goods—helping India move from reactive logistics to a more efficient, technology enabled ecosystem.

Value delivered

- Higher throughput and accuracy: AI integrates machine learning, computer vision, sensors, and robotics to reduce picking errors, prevent stockouts, and optimise inbound and outbound cycles.
- Sharper demand forecasting: Models ingest POS data, search trends, and festival-driven spikes to reduce emergency cross-dock shipments and stabilise replenishment.
- Autonomous operations: Agentic AI manages dock scheduling, inventory placement, quality control automation, and transport handoffs, mirroring global benchmarks for self-governing warehouses.

Adoption playbook

- Deploy AI-assisted slotting and replenishment early to stabilise demand surges and reduce carrying costs.
- Integrate computer-vision-based quality control (QC) and anomaly detection for damage checks and improved inventory accuracy.
- Layer agentic AI onto WMS and TMS workflows to enable automated dock sequencing, task orchestration, and predictive exception handling.



ULIP: The digital backbone of India's logistics ecosystem

The ULIP integrates logistics data across ministries, giving shippers, 3PLs, and digital platforms programmable access to rail, road, port, and air-cargo systems. By linking data that was earlier spread across multiple portals, it helps create smoother workflows, clearer visibility, and faster decision-making across the supply chain.

As of Feb 2026, ULIP connects information from 45 government systems across 11 ministries on one unified platform, forming the core digital layer that supports India's shift toward smarter, integrated logistics.

Value delivered

- ULIP provides an aligned operational picture across transport modes, reducing coordination gaps and helping organisations respond to disruptions with greater speed and clarity.
- The platform enables smoother digital interactions for tasks such as shipment visibility, gate processes, and documentation, supporting faster cargo turnaround.
- With improved predictability of cargo movement, firms can operate with lower buffer stocks and tighter planning cycles.

Adoption playbook

- Integrate ULIP-linked capabilities into transport and warehouse systems in phases, beginning with corridors or nodes where visibility gaps or delays create the highest operational risk.
- Map recurring operational losses such as waiting times, penalties, or handover delays to ULIP features that can directly address these pain points and strengthen end-to-end performance.



Digital twins, IoT and predictive warehousing

Digital twins create high-fidelity virtual models of warehouses, enabling operators to test storage layouts, SKU movement, labour flows, and automation options in a simulated environment before committing to physical changes. A leading example is PepsiCo's collaboration with Siemens and NVIDIA, where warehouse facilities are modelled using Siemens Digital Twin Composer on the NVIDIA Omniverse platform. This allows operators to simulate throughput, storage density, and potential operational redesigns before implementing physical changes.[26]

IoT sensors extend these digital twins into real time by capturing data on temperature, vibration, equipment stress, and forklift or AMR movement. Together, these systems enable warehouses to operate as predictive environments that can detect risks early and adjust operations more efficiently.

Value delivered

- **Faster design cycles:** Digital-twin simulations shorten planning from months to days and help avoid unnecessary CAPEX by validating layouts virtually.
- **Improved equipment reliability:** IoT-linked twins flag early signs of stress in key assets, enabling timely maintenance and supporting cold-chain stability.
- **Better accuracy and safety:** Real-time sensor inputs improve picking precision, reduce collision risks, and strengthen operational safety in dense storage environments.

Adoption playbook

- **Establish a robust data foundation:** Equip facilities with essential IoT inputs and ensure warehouse systems capture structured, reliable operational data that can be used effectively within digital-twin environments.
- **Validate decisions through simulation:** Use digital twins to model peak-load scenarios, assess layout and SKU-flow options, and test automation choices virtually, enabling more informed and capital-efficient planning.
- **Scale twins across critical nodes:** Extend digital-twin deployment from individual warehouses to plants and distribution centres to create a unified simulation layer that supports coordinated, network-level planning and optimisation.



Digital Product Passports (DPPs)

DPPs are emerging as structured digital records that carry verified information about how a product is made, what materials it contains, and how it moves through its lifecycle. They serve as a transparent identity layer for products, enabling traceability, sustainability assurance, and more informed logistics decision-making across supply chains.

Value delivered

- **Greater traceability and trust:** DPPs offer a clear digital trail of product information, strengthening authenticity checks and making supply chains more transparent.
- **Better circular-economy outcomes:** By capturing details on materials and repair or reuse potential, they support efficient reverse-logistics flows and more sustainable asset management.

Adoption playbook

- **Integrate product-level data capture:** Build systems that can record and share essential information—such as material composition, batch details, and compliance attributes—in a standardised digital format.
- **Start with high-priority categories:** Introduce DPPs in product lines where global buyers or regulations increasingly demand traceability, ensuring early readiness and reduced compliance risk.

26. PepsiCo Announces Industry-First AI and Digital Twin Collaboration with Siemens and NVIDIA: PepsiCo website

Logistics towers/control towers

Logistics control towers act as a central nerve-centre for supply chains, giving organisations a unified, real-time view of movements across road, rail, ports, ICDs, and cold-chain nodes. By replacing scattered, manual coordination with an integrated oversight layer, they enable faster decisions and more reliable operations. They deliver:

- Real-time visibility across multiple transport modes
- Route optimisation and proactive alerts, including temperature-related warnings for cold-chain cargo
- Paper-light workflows through digital documents
- Early risk detection for temperature-sensitive or high-value shipments

Value delivered

- **Better capacity use:** Load consolidation helps improve vehicle fill rates and can significantly reduce emissions across shared transport routes.
- **Smoother movement:** Digital documentation cuts down checkpoint delays and reduces compliance-related friction during transit.
- **More predictable operations:** Milestone-based coordination limits last-minute disruptions and improves reliability across 3PL, cold-chain, and export networks.

Adoption playbook

- **Build on national digital platforms:** Use ULIP and LDB data to bring port, rail, and road events into one consolidated view for better oversight.
- **Use essential IoT inputs:** Add temperature, vibration, and reefer-health signals to quickly flag cold-chain issues.
- **Digitise key documents:** Shift to electronic Bills of Lading (e-BoL) and electronic Proof of Delivery (e-POD), and gate passes to reduce waiting time and speed up clearances.



Global best practices

Global standards for safe and sustainable warehousing

Global best practices emphasise safety, worker dignity, automation transparency, and climate readiness in modern warehousing. The International Transport Workers' Federation (ITF) launched the world's first global warehousing standards, the "8 Principles for Decent Work", covering safety, technology transparency, just transition, and ethical labour practices.

The International Organisation for Standardization (ISO) publishes standards for pallets (ISO 8611), packaging performance testing, and the safe handling of transport packages, widely adopted by global warehouses to ensure interoperability and safety. These global norms align with India's e-handbook on warehousing standards, drafted by DPIIT.

Low-carbon and zero-emission cold-chain technologies

Global cold-chain transformation is shifting away from diesel refrigeration toward clean cooling technologies. IceBattery thermal storage containers launched in India with CONCOR in February 2026 enable diesel-free temperature control and maintain stability during transit delays.

Solar-driven systems such as the EU's CoolZero programme combine Phase-change Materials (PCM), solar refrigeration, and MOF heat exchangers to deliver zero-carbon, off-grid cold rooms. Meanwhile, electric Transport Refrigeration Units (TRUs) such as the SolarTechTRU provide fully electric cooling with no diesel use and zero particulate emissions. These technologies set the benchmark for low-carbon cold-chain logistics.

Global standards for multimodal logistics hubs

World-leading multimodal hubs combine integrated infrastructure, digital twins, strong governance frameworks, and sustainability-led operations. The Agence Française de Développement (AFD) has issued global guidelines for multimodal hubs, emphasising governance, digital integration, gender inclusion, and safety, now widely regarded as best practice for sustainable hub design.

Research on North American multimodal networks shows that optimised cross-border hubs can raise capacity utilisation from 62% to 89%, reduce idleness costs by USD 4.3 million per year, cut transit time by 11.2 hours, and lower total operational costs by 18.5%. DHL's global multimodal express model demonstrates performance advantages: 30–50% faster than ocean freight and 10–15% cheaper than air, supported by climate-resilient routing through hubs such as Dubai and Panama.

Current shortfalls and corrective pathways

Twin interoperability
(Private twins)

Issue a **DPIIT model schema** for warehouse digital twins (layout, slot, asset IDs, telemetry fields). Tie future **automation grants** (state/central) to conformance.

Cold chain energy KPIs

Notify kWh/MT benchmarks by temperature bands; publish a MoFPI scorecard to direct concessional finance.

ULIP to the edge

Extend ULIP reference adapters for MSME WMS/TMS so tier 2/3 players can integrate without heavy IT spend.

DFC/IWT first-mile feeders

Incentivise EV cargo 3 wheelers and reefer micro hubs that connect clusters to DFC terminals/IWT jetties.

Use GatiShakti layers to site these feeders.

Industry perspectives

Japfa India

AI will significantly transform logistics by making supply chains predictive, automated, and data driven. For a company like Japfa Foods India that supplies chilled chicken to restaurant chains, AI can improve efficiency across demand planning, production, and delivery. By analysing historical restaurant orders, seasonality, weather, and events, AI can forecast daily demand more accurately and align slaughter and processing schedules accordingly.

AI-based route optimisation can dynamically plan delivery routes based on traffic, delivery windows, and order volumes, improving fleet utilisation and reducing fuel costs. In cold-chain operations, AI combined with sensors can monitor temperature and transit conditions in real time, reducing spoilage and ensuring food safety.

In the planned small HoReCa store model, where Japfa holds inventory in neighbourhood hubs for restaurants to pick up, AI can play an important role in inventory planning and replenishment by predicting demand from each restaurant and ensuring that the right SKUs are stocked at each location. AI can also help determine the optimal fleet size and delivery planning for serving nearby restaurants that prefer deliveries rather than pickup.

Potential impact for Japfa

- Better demand forecasting leading to improved production planning and lower wastage.
- Optimised delivery routes and fleet sizing reducing logistics cost and improving service levels.
- Level optimisation at HoReCa hubs to ensure availability while minimising spoilage.
- Integrated farm-to-restaurant planning aligning bird placement, slaughter, and customer demand.

Overall, AI can help Japfa move from a reactive distribution model to a predictive supply chain, improving freshness, reducing cost, and strengthening its position as a reliable institutional chicken supplier.

AdiVishnu Marine Foods Private Limited

Adivishnu Marine Foods Private Limited (Kakinada), shared critical insights on the challenges mid-sized exporters face in adopting end-to-end automated cold chain and warehousing systems. They noted that while initial infrastructure was established through the company's own investment and available government support, significant additional capital is now required to scale operations and integrate advanced automation.

The company stated that a 50% matching government grant would help accelerate technology adoption and strengthen competitiveness in export-oriented cold chain operations. It also highlighted persistent hurdles in certification procedures and export approvals, underscoring the need for a robust single-window clearance system to reduce delays and ease the compliance burden.

Given that the firm is located nearly three hours from the port city of Visakhapatnam, the company stressed that improving road connectivity and logistics infrastructure is essential for reducing transit time, maintaining temperature integrity, and improving overall export efficiency.

Aster Cargo Private Limited

Aster Cargo Private Limited, emphasises that India's warehousing, cold chain, and logistics landscape is undergoing a defining transformation, where rapid infrastructure expansion is converging with unprecedented technological advancement. Government initiatives such as PM Gati Shakti, increased budgetary allocations for logistics efficiency, and targeted support for food processing and cold chain development have collectively laid a strong foundation for sustainable sectoral growth.

Aster Cargo Private Limited recently received approval for a Central Government grant to establish an integrated cold chain facility focused on meat processing and value addition. This initiative reflects the company's commitment to strengthening seamless farm-to-fork supply chains in line with the nation's broader vision. The company believes that modern cold chain infrastructure, supported by automation, IoT-enabled monitoring systems, and energy-efficient technologies, will play a critical role in reducing waste, preserving product integrity, and enhancing India's agri-export competitiveness.

Looking ahead, the future of logistics in India will be fundamentally shaped by multimodal connectivity, digital transparency, and specialised temperature controlled networks aligned with global benchmarks. Integration of AI-led demand forecasting, blockchain based traceability, and smart warehousing ecosystems will further elevate operational efficiency, reliability, and resilience across the supply chain.



05

Policy frameworks, government initiatives and budget measures

Government policy and infrastructure investment are playing a central role in improving India's logistics performance. Initiatives such as PM Gati Shakti, the National Logistics Policy, Dedicated Freight Corridors, and National Multimodal Logistics Parks are strengthening multimodal connectivity, improving planning coordination, and supporting more efficient freight movement nationwide.

Policy frameworks

Scheme/policy: PM Gati Shakti – National Master Plan (NMP)

Key feature and outlay	Intervention	Impact
The PM Gati Shakti – National Master Plan unifies 46+ ministries and 36 States/UTs on a single national GIS platform, using 1,652+ geospatial layers to align Bharatmala, Sagarmala, UDAN, IWAI, and the Industrial Corridors. The platform also supports district-level planning initiatives across early pilot districts. India's logistics digitisation layer establishes standards for warehousing, packaging, multimodal operations, and skills. Powered by ULIP, the platform connects 45 government systems through 137 APIs, enabling 200+ crore API transactions by Feb 2026.[27] Meanwhile, the Logistics Data Bank (LDB) has tracked 75+ million EXIM containers across 101 ICDs, creating one of the country's deepest logistics visibility stacks.	GIS-based, cross-ministerial platform integrating rail, road, ports, inland waterways and airports; hosted on MeghRaj and powered by BISAG-N/ISRO imagery to identify gaps, avoid duplication, speed approvals and enable evidence-based logistics siting.	**Cost reduction:** Logistics costs reduced to ~8% of GDP (from 13–14% earlier). **Project efficiency:** 293 infrastructure projects aligned under the NMP. **Faster execution:** Reduces duplication and improves multimodal connectivity.

Scheme/policy: National Logistics Policy (NLP) – incl. ULIP & LDB

Key feature and outlay	Intervention	Impact
The National Logistics Policy (NLP) is anchored on four pillars: Integrated Digital System (IDS), ULIP, E-LOGS, and the System Improvement Group (SIG). It aims to reduce logistics costs to ≤8% of GDP, while achieving a top 25 global LPI ranking by 2030. The policy also sets national standards for warehousing, packaging, multimodal operations, and logistics skills.	Interoperability and visibility stack: ULIP enables real-time, multimodal data exchange, while the Logistics Data Bank (LDB) provides RFID-based container visibility. Supporting standards and state policies aim to reduce paperwork, speed handoffs, and enable logistics control towers. Targets: Achieve a top 25 global LPI ranking by 2030 and bring logistics costs closer to global benchmarks.	• **ULIP:** Completed 200+ crore API transactions across 45+ government systems. • **LDB:** Tracked 75+ million EXIM containers across 101 ICDs. • **LPI improvement:** India's LPI ranking improved from 54 to 38. • **State adoption:** 27 states have notified logistics policies.

27. ULIP portal

Scheme/policy: National Multimodal Logistics Parks (MMLP) (Programme under Bharatmala/PM Gati Shakti)

Key feature and outlay	Intervention	Impact
India has approved 35 Multi-Modal Logistics Parks (MMLPs) to shift freight to rail and waterways, reduce logistics costs, and strengthen consolidation; each park integrates road, rail (DFC), inland waterways, and air cargo. Each MMLP is designed as a full-service logistics node with warehousing, cold storage, ICDs, bulk and break-bulk terminals, bonded facilities, customs clearance, and truck terminals, enabling multimodal cargo aggregation and efficient long-haul freight movement.	Large intermodal hubs with rail, road, IWT and air connectivity; modern warehousing, cold chain and VAS. Decongest urban logistics, enable freight consolidation and scheduled line-haul; aligned with National Master Plan (NMP) corridor strategies.	• **Network level cost & reliability gains:** Park level scale and connector certainty → lower handling/linehaul cost, less variability. • **Cost savings:** Cuts logistics costs from 20% to 7–8% via a modal shift.[28] • **Efficiency:** Enables consolidation, faster transfers & reduced transit delays.

Scheme/policy: Dedicated Freight Corridors (DFC) – EDFC & WDFC

Key feature and outlay	Intervention	Impact
India's Dedicated Freight Corridors (EDFC & WDFC) span 2,843 km of freight-only rail, with EDFC operational and WDFC ~93% complete; designed for double-stack containers, 32.5-ton axle loads, and speeds up to 99 km/h. The INR 81,459 crore programme (~96–97% complete) will shift long-haul freight to rail and strengthen corridor-based logistics efficiency.	High-capacity, freight-only rail with double-stack operations, higher axle loads, and faster port–hinterland movement; supported by Gati Shakti Cargo Terminals for cargo aggregation.	• Predictable trunk capacity enables timetabled freight, automation-ready cross-docks, lower inventory cover, and a modal shift from long-haul road; it also improves terminal productivity and export reliability. • **Throughput:** ~352–371 trains/day on DFC (FY25). • **Capacity:** 1,500 m freight trains. • **Benefits:** Faster port connectivity, decongested routes, lower emissions.

Scheme/policy: PM Gati Shakti – MDoNER (North-east implementation via PMS/ Dashboards/Geo tagging)

Key feature and outlay	Intervention	Impact
MDoNER Gati Shakti integrates gap analysis, project monitoring, geo-tagged progress, and maker–checker data validation. 20+ dashboards and GIS tools enable real-time tracking of delays, financial/physical variance, and project completion.	Regional operationalisation of Gati Shakti: project monitoring system, mobile geo-tagging, maker–checker data validation and multi-level dashboards; GIS-based gap analysis mandatory before project sanction (NE Gati Shakti MIS).	• Geospatial tracking and MIS enable evidence-based sanctioning, flag delays/variances and ensure need-based CAPEX; a replicable model for converting NMP plans into execution.

28. Assessment of Logistics Cost in India report: DPIIT (September 2025)

Union Budget 2026-27: Key takeaways

The Union Budget 2026–27 makes logistics a national growth engine with record-breaking capital expenditure and reform activities.[29]

National infrastructure and logistics

Public capital expenditure (total)

- INR 12.2 lakh crore total public capex (BE 2026–27), positioning infrastructure as a core growth lever.
- Transport outlay (Expenditure of major items): INR 5,98,520 crore in BE 2026–27 (as listed under "Expenditure of major items" in the key features document).

MoRTH—Road works

- Works under roads wing – INR 86,125 crore (BE 2026–27); the provision includes development of ropeways, development of Multi Modal Logistics Parks (MMLPs) on the roadside of Expressways/National Highways, and development of strategic and border roads.[30]

Trunk connectivity for freight and cold chains

- New Dedicated Freight Corridor (DFC): Dankuni (East) → Surat (West) announced to improve long-haul freight reliability and speed.
- Inland waterways & coastal shipping: 20 new National Waterways to be operationalised in five years; Coastal cargo Promotion scheme to raise waterborne freight share to rise from 6% to 12% by 2047.
- Container manufacturing scheme to augment domestic container availability (enabling refrigerated/reefer capacity in the medium term).

Customs and warehousing framework: Structural reforms

Operator-centric customs warehousing

Framework transformed into a warehouse operator-centric system with self-declarations, electronic tracking, and risk-based audit.

Single digital window and customs integrated system (CIS)

Cargo clearance approvals across government agencies to be processed through a single, interconnected digital window by the end of the year; CIS to be rolled out within two years.

Trade facilitation levers relevant to warehousing

- Authorised Economic Operator (AEO) duty deferral period extended to 30 days for Tier 2/3: eligible manufacturer importers to get the same deferral facility.
- Validity of advance rulings extended from three to five years.
- Factory to ship export cargo clearance enabled via electronic sealing.

Cold chain enablers: Fiscal & multimodal

Safe harbour for component warehousing in bonded warehouses

Safe harbour for non-residents at 2% profit margin of invoice value for component warehousing in bonded warehouses; effective tax ~0.7%, lower than competing jurisdictions.

Backbone connectivity that lowers cold chain line haul cost

DFC (Dankuni–Surat) + 20 waterways + coastal cargo scheme → modal shift to rail/water, improving temperature integrity, cost, and reliability for perishables and pharma.

Container manufacturing

Domestic container manufacturing push (supports medium-term growth in reefer container availability).

MSME and export facilitation measures for logistics

- INR 10,000 crore SME Growth Fund to nurture future "Champion" MSMEs (supply chain/3PL/e e-commerce adjacency).
- Removal of INR 10 lakh value cap per consignment on courier exports, aiding small exporters of perishables/frozen foods.
- DFC (Dankuni–Surat) + 20 waterways + coastal cargo scheme → modal shift to rail/water, improving temperature integrity, cost, and reliability for perishables and pharma.
- Domestic container manufacturing push (supports medium-term growth in reefer container availability).

Ministry of Consumer Affairs, Food and Public Distribution: Warehousing and food logistics

- Investment in public enterprises — Food Corporation of India (FCI)
- INR 20,600 crore investment (Public Enterprises) to support buffer stocks, scientific warehousing, and national food security logistics, as presented under Budget statements covering Investments/Resources of Public Enterprises alongside DoFPD SBE.[31]

Digital and services infrastructure supporting logistics

Tax incentives for data centres: A tax holiday until 2047 has been introduced for cloud services exported from India-based data centres. The framework also provides a 15% safe-harbour margin for related-party services.

29. Union Budget 2026-27: PIB
30. Notes on Demands for Grants, 2026-2027 (Demand No. 86) - MoRTH
31. Expenditure Profile 2026-2027 - Ministry of Finance (February 2026)



06
Case studies and industry inputs

Case study 1

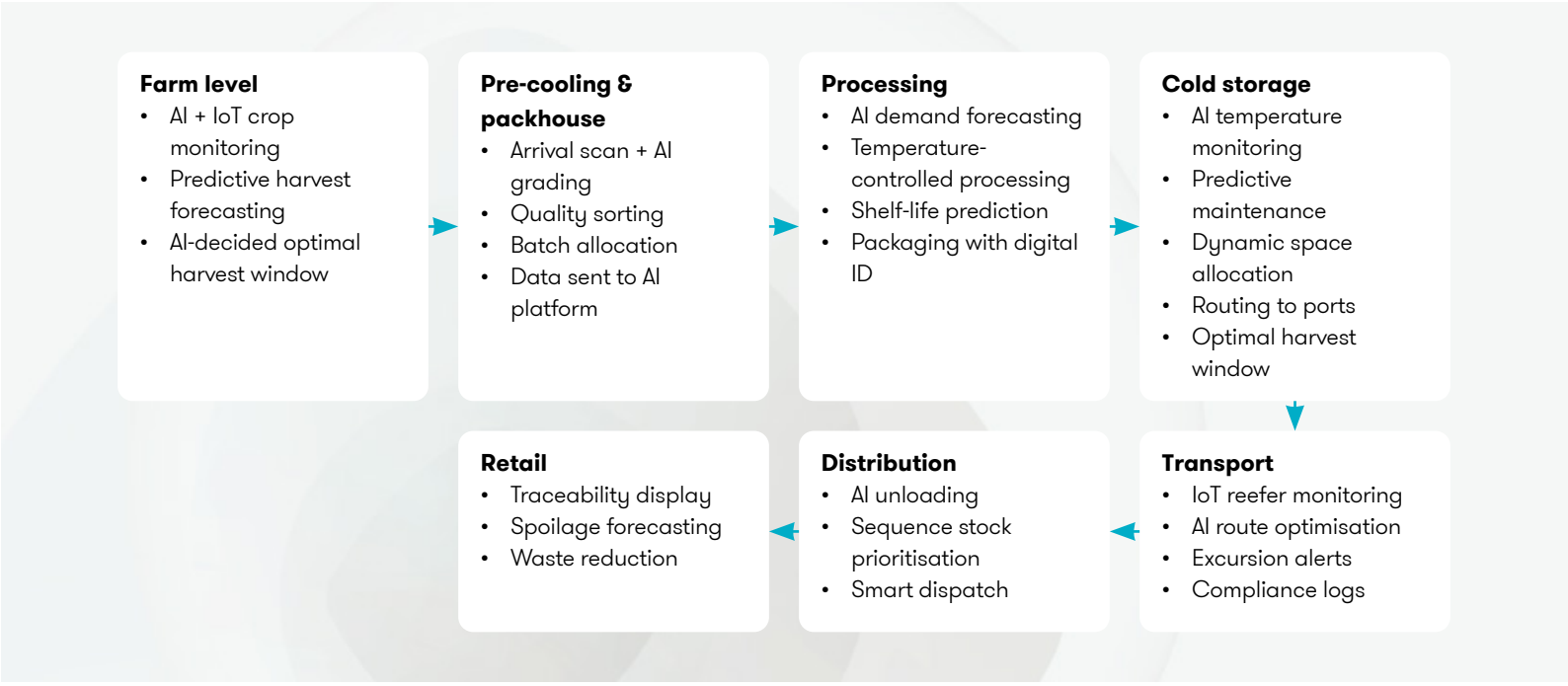
AI-integrated farm-to-cold-chain system (FrieslandCampina)[32]: Netherlands

The Netherlands is a global leader in agricultural digitisation and cold chain optimisation. The country has formally integrated AI-driven monitoring, predictive analytics, and data platforms into its food supply chain.

A 2023 Dutch regulation mandated the use of AI-driven monitoring systems in the food cold chain to ensure traceability, compliance, and reduction of foodborne risks. These systems are enhancing food security by improving handling precision, strengthening logistics coordination, and enabling proactive risk management across the supply chain.

What the system includes

1 Farm-level AI & sensor integration
2 AI-orchestrated logistics flow
3 Enterprise-Scale "grass to glass" data platform (Friesland Campina Example)
4 AI-driven monitoring in cold storage & transport



Impact

- Reduced wastage, enhanced shelf-life, and higher export reliability.
- Improved compliance due to AI-based traceability logs.
- 'Strengthened Netherlands' position as a global agri-export powerhouse.

What is the Netherlands doing differently?

1 Regulatory mandate for AI in cold chains
2 Farm-level AI integration (predictive agriculture)
3 AI-orchestrated logistics (smart routing via ports)
4 Enterprise-grade "grass to glass" data platforms (FrieslandCampina model)
5 Predictive cold storage & reefer monitoring

What India should integrate

1 Adopt a national policy mandating AI monitoring
2 Create a unified "farm-to-logistics AI platform" (expand ULIP for agri).
3 Deploy AI for route optimisation across multimodal networks
4 Build enterprise-level "data lakes" for agri-cold chains
5 Support predictive maintenance adoption in cold storages.

32. Farmer to Consumer Traceability Services for FrieslandCampina Case study: Rockwell automation

Case study 2

Swarm Robotics in cold warehousing: United Kingdom (UK)

The UK has become a testbed for robotic, automated, and swarm based cold warehouse operations led by companies such as New Cold, DHL, and DPD UK.

Case A: New Cold's automated cold storage facility (Corby, UK)[33]

New cold built one of Europe's most advanced robotic cold warehouses, replacing traditional workforce movement with automated systems.

Key features

- Automated cranes ("robotic stackers") operate in frozen aisles at –23°C, moving 180,000+ pallets without forklifts.
- AI-driven software coordinates movements with near-zero human intervention.
- Vertical, sealed, robot-only environment improves energy efficiency by up to 50% per pallet.
- Swarm-like behaviour: Though referred to as cranes, the system operates as a coordinated swarm, where multiple automated units:
  - Navigate independently
  - Respond to dynamic warehouse demand
  - Optimise pallet retrieval collectively

Case B: DHL's multi-robot swarm in UK warehouses (1,000+ robots)[34]

DHL supply chain launched a £550 million robotics automation expansion, deploying 1,000+ autonomous robots across the UK.

Characteristics of Swarm Robotics

- Robots (Locus Origin, Robust.AI Carter, Boston Dynamics Stretch) work cooperatively, sharing tasks and space.
- AI-powered vSLAM navigation enables real-time swarm coordination.
- Carter robots switch between autonomous + human-guided modes instantly, acting as dynamic swarm units.
- Obstacle detection + AI routing = coordinated robotic fleet.

Impact

- Productivity improved by up to 60%
- Energy use reduced by ~50%
- Zero-human zones increased reliability 24×7

What is unique in the UK approach?

1 Robot-only cold warehouses (NewCold UK)- Automated cranes handling 180,000+ pallets at –23°C.
2 Swarm Robotics for warehouse efficiency-1,000+ autonomous robots
3 Hybrid human-robot collaboration models
4 AI-powered warehouse self-optimisation by robots sharing workload
5 Vertical automated cold warehouse model reduces energy use by up to 50% per pallet

What India should integrate

1 Build India's first robotic cold warehouse pilot (PPP) model-focus: robotic stackers, AS/RS, sealed vertical storage.
2 Introduce a national "warehouse robotics incentive scheme".
3 Deploy AI for route optimisation across multimodal networks
4 Combine robotics + AI route planning for cold chain nodes
5 Standardise warehouse designs for robots (vSLAM-friendly).

33. Star Refrigeration doubles cold storage capacity for NewCold's high bay warehouse expansion in Corby
34. DHL to deploy 1,000+ additional robots across UK Operations: DHL Group

Case study 3

India: WayCool Foods — AI-enabled farm to fork cold chain & supply system[35]

WayCool Foods, one of India's largest agritech supply-chain companies, operates a data-driven, AI-enabled integrated food and cold-chain network. Between 2023 and 2025, the company implemented SAP S/4HANA alongside a proprietary AI platform stack to build an advanced farm-to-retail digital supply chain, improving forecasting accuracy and reducing wastage.

By 2024, WayCool was processing food from 200,000+ farmers, reducing food wastage by up to 96% while increasing farmer incomes by over 13%. The company manages the entire value chain, from farm-gate collection and cold-chain logistics to automated warehousing, demand prediction, and retail distribution, making it one of India's closest parallels to digitally integrated Western cold-chain models.

What the system includes

WayCool operates a fully coordinated, AI-driven logistics ecosystem where real-time data from procurement centres, reefer trucks, warehouses, and retailers is continuously analysed. The AI engine optimises:

- Cold-chain routing to minimise spoilage, congestion, and temperature risk.
- Loading patterns to prevent pressure damage to delicate produce.
- Real-time exception handling, triggering interventions during temperature drift or delays.
- Dispatch timing aligned with consumption peaks in urban markets.

These decisions are synchronised through an SAP-integrated control tower, ensuring farmers, warehouse teams, logistics operators, and retailers function as a single coordinated system.

Enterprise-scale integrated data platform
WayCool's SAP S/4HANA based data platform acts as a single source of truth, connecting:

- Farmers and procurement
- Cold storage and processing centres
- Logistics and distribution
- Retail fulfilment

The system generates predictive insights on demand, pricing, shelf life behavior, quality trends, and optimal routing, making it one of India's closest parallels to the Netherlands' "grass to glass" digital supply chain.

35. WayCool Builds India's Sustainable Food Chain with SAP S/4HANA

AI-driven cold storage and distribution centres
- Cold chain points linked with IoT sensors feeding real-time temperature and stock data into the central platform.
- Predictive analytics support inventory rotation, shelf life maximisation, and spoilage avoidance.
- Integration ensures precise control for sensitive produce (leafy greens, fruits, dairy-linked products).

Impact

- Up to 96% reduction in food wastage — among the highest documented in India.
- 13%+ increase in farmer income driven by better price discovery and crop planning.
- High shelf-life preservation due to predictive cold-chain management.
- End-to-end traceability improves compliance and export readiness.
- Demand-driven system, replacing India's traditional supply-driven model.

WayCool is widely cited as a global benchmark for integrated digital food supply chains.

Key differentiators in WayCool's digital supply chain

- Full-stack digitisation (farm → processing → cold chain → retail) versus siloed cold-chain interventions
- SAP S/4HANA backbone — rarely used at such scale in agrifood globally
- AI-guided farm production, tying agriculture directly to logistics and retail demand
- Data transparency across 200,000+ farmers, 100+ hubs, and multi-city retail networks
- Cold chain optimisation + demand forecasting integration (rare in India)

Policy and operational lessons from WayCool

- Mandate real-time cold-chain visibility for perishables (temperature, location, quality)
- Link ULIP with agri data platforms for farm to-logistics interoperability
- Promote cold-chain digital twins for route, demand, and shelf-life optimisation
- Standardise AI-based harvest planning (like WayCool's farmer advisory model)
- Provide incentives for platform level integration (farm procurement + cold logistics + retail)



07

Way forward and conclusion

Climate-resilient logistics ecosystem

- Strengthen infrastructure climate readiness through heat resistant materials, flood-adapted warehousing design, and resilient cold chain power backup systems.
- Expand low-carbon logistics corridors by integrating EV freight fleets, solar-powered warehouses, and green energy cold chain nodes.
- Deploy climate analytics platforms for route optimisation, weather risk forecasting, and freight disruption modelling.
- Incentivise climate-aligned infrastructure through green financing, carbon credit mechanisms, and sustainability certifications.

Building skills for next-generation logistics

- Create specialised training pathways in AI operations, data analytics, IoT device maintenance, and automation engineering for warehouse and fleet professionals.
- Develop certification programmes for cold chain technicians, robotics operators, and digital logistics coordinators.
- Integrate simulation-based logistics learning labs with AR/VR tools for hands-on operational readiness.
- Encourage partnerships between industry, academia, and skilling missions to bridge the talent supply gap in tech-enabled logistics roles.

Strengthening regulatory and institutional frameworks

- Update cold chain and logistics quality standards to incorporate AI based monitoring, automated compliance alerts, and digital audit trails.
- Encourage risk based inspection regimes supported by predictive analytics for food, pharma, and perishable logistics.
- Institutionalise unified command systems for multimodal coordination across central ministries and state logistics cells.
- Expand incentives for private sector investment in automation, scientific warehousing, and sustainable logistics assets.

Advanced digital integration & AI adoption

- Scale AI driven demand forecasting, real time temperature monitoring, and predictive maintenance models across storage and transport assets.
- Enable end to end digital traceability using IoT sensors, digital twins, and unified logistics data platforms.
- Promote automated decision support systems for shipment planning, cargo consolidation, and multimodal network optimisation.
- Establish sector wide standards for data interoperability, cyber security, and AI governance in logistics operations.

Intelligent and standardised infrastructure expansion

- Accelerate development of scientific, standardised, WDRA-aligned warehousing with automation-ready layouts and structured material-handling systems.
- Expand multimodal logistics hubs linked with rail freight corridors, inland waterways, and integrated cold-chain grids.
- Promote robotics-driven facilities for high-volume sorting, picking, palletising, and warehouse movement tasks.
- Implement national benchmarks for temperature-controlled storage, energy-efficiency, and safety protocols.

Industry ecosystem development

- Establish a national R&D centre for cold-chain automation.
- Develop indigenous robotics, sensors, and AI tools for India conditions.
- Reduce dependence on imported technologies and lower capex.
- Promote energy-efficient, automation-ready cold-chain models.

Conclusion

India's logistics and cold chain ecosystem is entering a decisive phase of transformation that will shape the nation's economic resilience, food security, and global competitiveness. As climate variability intensifies and supply chains grow more complex, the adoption of AI-enabled monitoring, predictive analytics, and automation is becoming essential to ensure safety, efficiency, and transparency across handling, storage, and distribution systems. Standardised, scientific, and automation-ready infrastructure—supported by a digitally skilled workforce—will remain central to building a high-performing logistics network suited to a rapidly evolving marketplace.

Looking ahead to Vision 2047, the logistics sector will play a defining role in positioning India as a modern, technology-driven, and sustainable global supply chain hub. A future-ready system must integrate climate-resilient assets, data-driven intelligence, and unified regulatory frameworks, supported by indigenous innovation through initiatives such as a national R&D centre for cold chain automation. With coordinated policy action, industry collaboration, and targeted investments, India is well placed to build a next-generation logistics ecosystem that strengthens food security, enables sustainable growth, and aligns with the country's long-term aspiration of becoming a developed and globally integrated economy by 2047.

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Glossary

AI	Artificial Intelligence
AIF	Agriculture Infrastructure Fund
AMI (ISAM)	Agricultural Marketing Infrastructure (Integrated Scheme for Agricultural Marketing)
API	Application Programming Interface
AS/RS	Automated Storage & Retrieval System
BISAG-N	Bhaskaracharya National Institute for Space Applications and Geo-Informatics
CA Storage	Controlled Atmosphere Storage
CAGR	Compound Annual Growth Rate
CHC	Custom Hiring Center
DFC	Dedicated Freight Corridor
DFCCIL	Dedicated Freight Corridor Corporation of India Ltd
DPIIT	Department for Promotion of Industry and Internal Trade
E-Logs	Electronic Logistics Monitoring System
EV	Electric Vehicle
EXIM	Export–Import
FMCD	Fast-Moving Consumer Durables
FMCG	Fast-Moving Consumer Goods
GDP (Logistics)	Good Distribution Practices
GIS	Geographic Information System
ICCVAI	Integrated Cold Chain and Value Addition Infrastructure
ICD	Inland Container Depot
IoT	Internet of Things
IWAI	Inland Waterways Authority of India
LDB	Logistics Data Bank
LPI	Logistics Performance Index
MIDH	Mission for Integrated Development of Horticulture
MMLP	Multi Modal Logistics Park
MoA&FW	Ministry of Agriculture & Farmers Welfare
MoC	Ministry of Cooperation
MoFPI	Ministry of Food Processing Industries
MoRTH	Ministry of Road Transport and Highways
NLP	National Logistics Policy
NMP	National Master Plan
PACS	Primary Agriculture Credit Societies
PCM	Phase Change Material
PHM	Post-Harvest Management
PLI	Production Linked Incentive
PMKSY	Pradhan Mantri Kisan Sampada Yojana
QSR	Quick Service Restaurant
Reefer	Refrigerated Truck/Container
SOP	Standard Operating Procedure
ULIP	Unified Logistics Interface Platform
VAS	Value Added Services
WMS	Warehouse Management System

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